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ABSTRACT

The dual concerns of economic competitiveness and national security have provided the main impetus behind the continued growth in support for research and development (R&D) by both government and industry. The funding of science and technology is a major factor behind capital and labor productivity increases. This report presents a summary of comprehensive measures of the financial and human resources that sectors of the U.S. economy devote to scientific and technological activities. Areas discussed include: (1) "R&D Expenditures"; (2) "Scientists and Engineers"; (3) "R&D Trends and the National Economy"; (4) "R&D Performance"; (5) "Research and Development by National Objective"; (6) "The Federal R&D Funds/Total Budget Funds Ratio"; (7) "The R&D/GNP Ratio"; (8) "Basic Research, Applied Research, and Development"; (9) "Basic Research"; (10) "Applied Research"; (11) "Development"; (12) "Full-Time Equivalent (FTE) R&D Scientists and Engineers"; (13) "International Comparisons"; (14) "Employment Trends"; (15) "S/E Labor Market Balance"; (16) "Sectoral Patterns and Trends"; (17) "Doctoral Scientists and Engineers"; (18) "Foreign Citizen Participation"; (19) "S/E Pipeline"; (20) "Precollege Science and Mathematics"; (21) "S/E Degree Production"; (22) "Entry to the S/E Labor Market." Appendices include technical notes and detailed statistical tables. (CW)

# national patterns of science and technology resources: 1987



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# foreword

The dual concerns of economic competitiveness and national security have provided the main impetus behind the continued growth in support for research and development by both Government and industry. Additionally, the Nation's funding of science and technology is a major factor behind recent capital and labor productivity increases. Credit for these improvements in the economy and the ability to compete effectively in international markets must be shared by all sectors of the Nation's economy—government, industry, academia, and other nonprofit institutions. The National Science Foundation, in attempting to monitor the health of U.S. science and technology, assembles and analyzes comprehensive measures of the financial and human resources that each of these sectors devotes to scientific and technological activities. This annual report presents a concise but comprehensive summary of such information.

This publication complements the National Science Board's *Science Indicators* and *Science and Engineering Personnel: A National Overview* developed by this Division. The 1987 data presented in this current report reflect estimates for research and development programs contained in the Federal 1988 budget.

The Division of Science Resources Studies, responsible for the generation of this and other reports, continues to seek suggestions for their improvement from the user community. Comments on possible improvements will be greatly appreciated and will help in the development of future reports.

William L. Stewart
Director, Division of Science
Resources Studies
Directorate for Scientific,
Technological, and
International Affairs

January 1988

# acknowledgments

This report was prepared by John E. Jankowski, Jr., Science Resources Analyst, Economic Analysis Studies Group.

Supervision, review, and guidance were provided by John R. Chirichiello, Study Director, Economic Analysis Studies Group, Leonard L. Lederman, Head, Special Analytical Studies Section, Charles H. Dickens, Head, Surveys and Analysis Section, and William L. Stewart, Director, Division of Science Resources Studies.

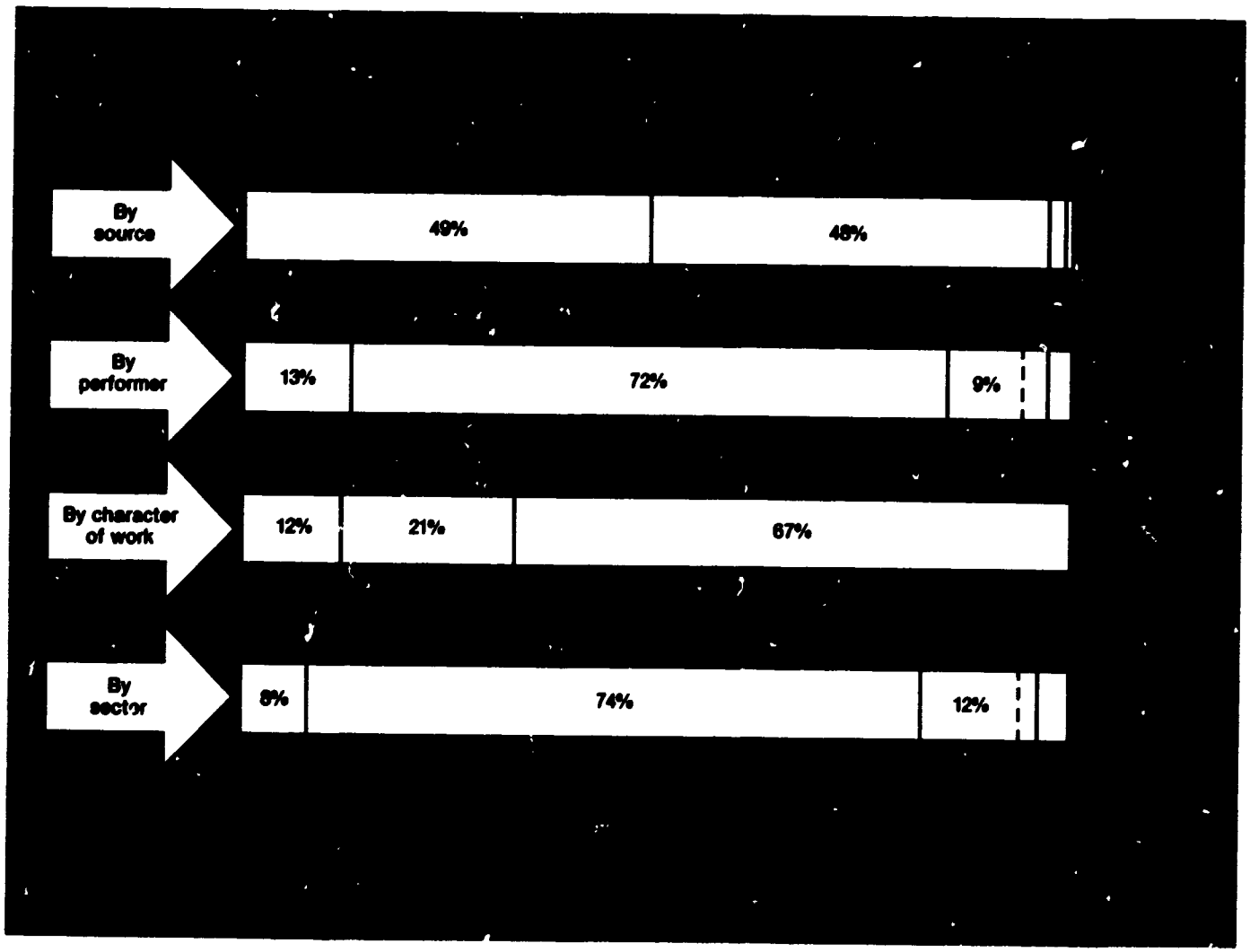
# contents

# summary

## r&d expenditures

The Nation is expected to spend $123.1 billion on research and development in 1987 (chart 1). This amount is 7 percent more than was spent in 1986, or 4 percent more after adjustment for inflation.[1] The Federal Government is expected to provide $60.4 billion (9 percent growth from 1986) and industry support is estimated at $58.6 billion (5 percent growth); combined, these two sources provide about 97 percent of the national research and development (R&D) total. Universities and colleges are expected to provide $2.7 billion in 1987 (8 percent growth from 1986). In absolute dollars, Federal R&D expenditures are expected to grow by $5.1 billion; industry expenditures by $3.0 billion; and universities and colleges expenditures by $0.2 billion. These 1987 estimates represent a continuation in a 12-year pattern of expanding real R&D growth.

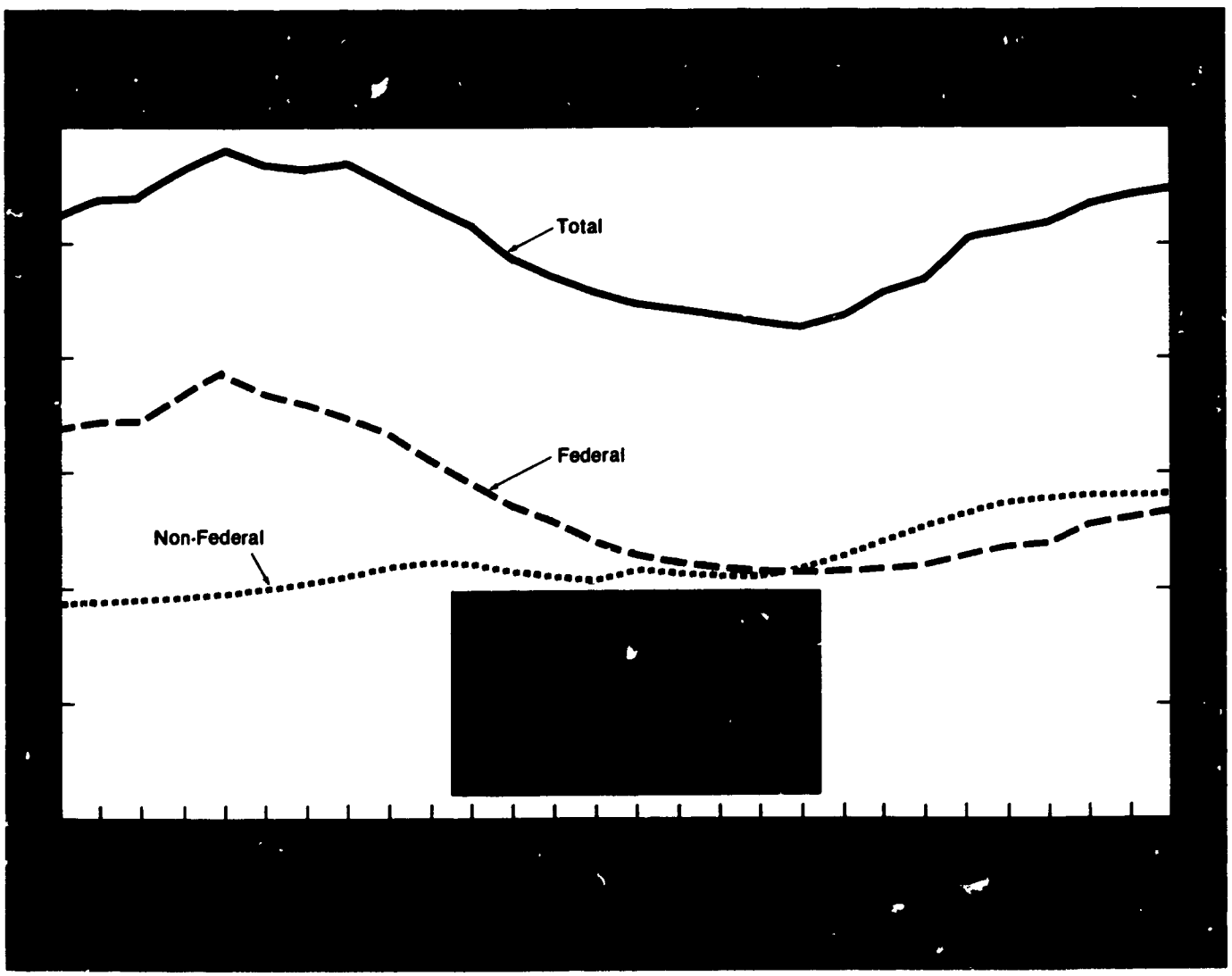
[1] In the absence of a reliable R&D cost index, the implicit price deflator for the gross national product (GNP) is used to convert R&D expenditures to constant 1982 dollars. The GNP deflator includes the effects of price changes for all final goods and services in the economy; therefore, it can indicate only approximate changes in the cost of inputs specifically related to R&D performance.



Between 1968 and 1975, real R&D funding fell almost annually; overall, such expenditures were down 9 percent. Then, following recovery from the 1974 oil embargo and 1975 recession, a significant funding reversal occurred. R&D expenditures in the United States more than doubled within just 6 years, jumping from $39 billion in 1976 to $79 billion in 1982. When adjusted for inflation, this 6-year increase was about 28 percent. Initially, the primary R&D emphasis by both Federal and non-Federal sources was on nondefense activities such as efficient energy use and pollution abatement. In 1981, however, Federal R&D support began to shift toward defense. Industry R&D expenditures on energy and pollution abatement also slowed, increasing during 1981 and 1982, for example, at only one-third the rate reported for the previous 4 years.

Overall, constant-dollar R&D expenditures between 1980 and 1986 increased at an average annual rate of 5.4 percent, compared to a 4.1-percent average annual growth for the 1975–80 period. Real R&D growth slowed to 4 percent in 1986—which is also the rate of increase estimated for 1987. Most R&D growth in the eighties has been fueled by major increases in Federal support for defense-related R&D programs—up about 80 percent in real terms since 1980. There also is evidence that the Economic Recovery Tax Act (ERTA) of 1981 began to have a small but positive effect on R&D spending across a number of industries during 1981 and beyond. ERTA offered U.S. companies an incentive to increase domestic R&D spending by providing a 25-percent tax credit for incremental R&D expenditures made between July 1, 1981, and December 31, 1985. The Tax Reform Act of 1986 extended the R&D tax credit through 1988, although at a reduced rate of 20 percent.

The proportion of gross national product (GNP) spent on R&D activities has increased each year since 1978, growing from 2.1 percent to an estimated 2.7 percent in 1986 (chart 2). During this 8-year period, national R&D spending increased at an average annual constant-dollar rate of 5.2 percent compared with a 2.2-percent rate of



growth for the Nation's GNP. The estimated 1987 R&D/GNP ratio, though essentially level with that for 1986, is at the highest point since 1968.

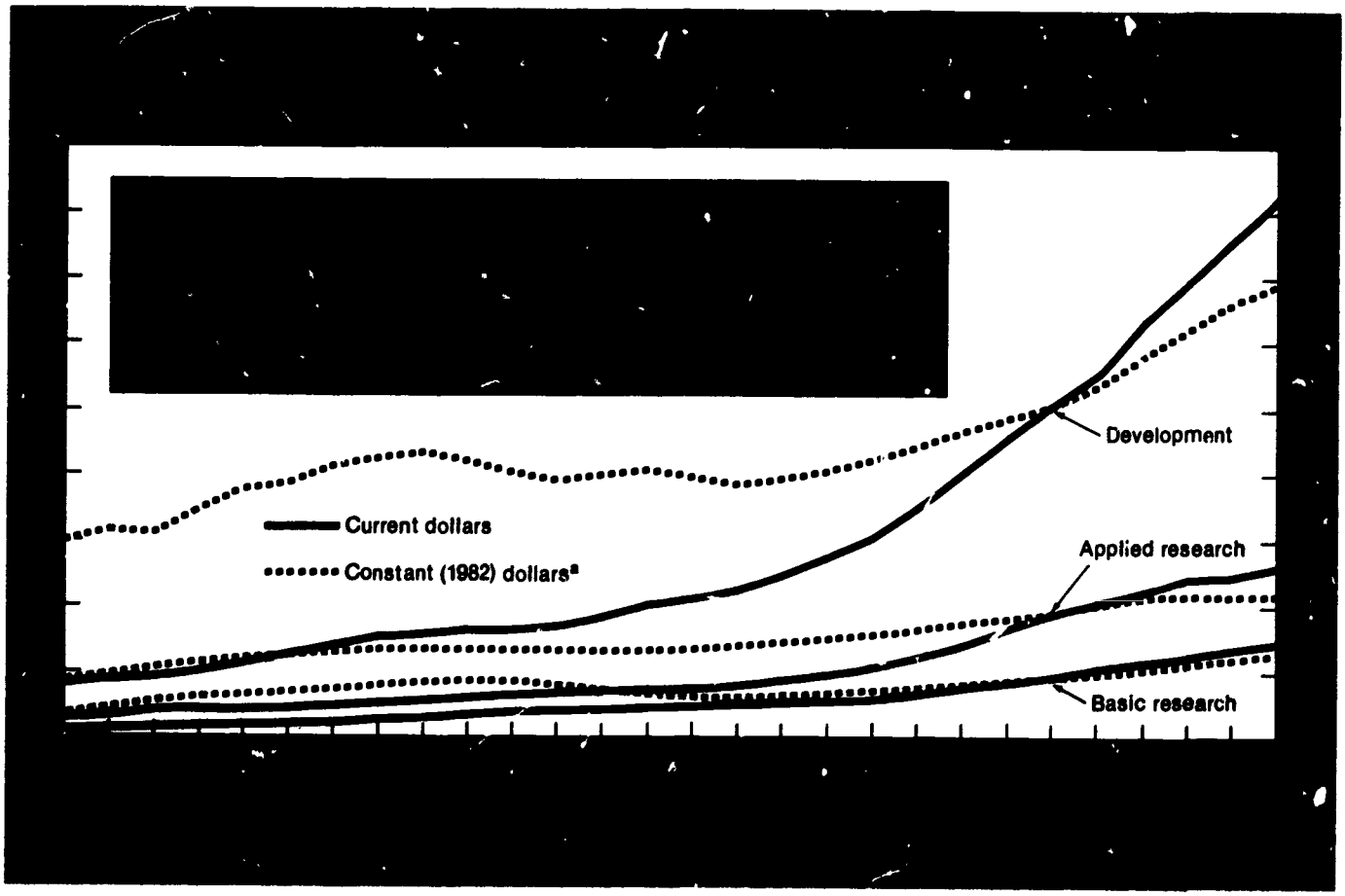
The United States spends more money annually on R&D activities than any other nation; it also spends more than France, West Germany, the United Kingdom, and Japan combined. As a proportion of GNP, U.S. R&D expenditures are comparable to those of Japan (2.8 percent) and West Germany (2.7 percent). The R&D/GNP ratios of France (2.4 percent) and the United Kingdom (2.2 percent) are close behind. However, when only civilian (nondefense) R&D expenditures are compared to GNP, the U.S. ratio (1.8 percent) is substantially lower than that of Japan (2.8 percent) and West Germany (2.6 percent). The nondefense R&D/GNP ratios in France and the United Kingdom are 1.9 percent and 1.5 percent, respectively.

In 1986, the Federal Government was the source of 49 percent of total R&D expenditures in the United States—the first time since 1979 that the Federal share of R&D support exceeded that provided by industry. The 1986 Federal total of $55.3 billion was 8 percent higher than that of 1985 (5 percent higher in real terms). Estimates for 1987 show a 9-percent increase in Federal R&D support (to $60.4 billion), or 6 percent after adjustment for inflation. Defense spending is expected to primarily contribute to this growth, although R&D support for health and space also is increasing.[2] Federal funds for research and development are estimated at 7 percent of total fiscal year 1987 budget authorizations: 14 percent of Federal defense funds are for research and development, compared to 3 percent of total nondefense authorizations.

Non-Federal R&D spending is expected to increase 6 percent in both 1986 and 1987, and should reach $62.7 billion in the latter year. In real terms, the increases are estimated at 3 percent for 1986 and 2 percent for 1987.

In 1986, the research portion of national R&D spending amounted to an estimated $38.9 billion—34 percent of the total. This was 3 percent above the 1985 level (0.5 percent in real terms). Basic research spending was up an estimated 5 percent in real terms, whereas estimated applied research spending fell 2 percent in 1986 after adjusting for inflation. Development spending amounted to $75.8 billion or 66 percent of R&D expenditures, 9 percent more than in 1985 (6 percent in real terms). These increases were in keeping with long-term growth trends for both total R&D spending (chart 3). The expected 1987 increases are 6 percent for basic research, 5 percent for

[2]Office of Managment and Budget, "Special Analysis J," *The Budget of the United States Government, Fiscal Year 1988* (Washington, D.C.. Supt. of Documents, U.S. Government Printing Office, 1987.)



applied research, and 8 percent for development. These represent real-term increases of about 2 percent each for basic and applied research, and 5 percent for development. The higher growth rate for development reflects intensified defense R&D spending (90 percent of which is development) by the Federal Government as well as a shift in industry's commitment to development over applied research efforts.

Even though the Federal Government increasingly emphasizes development, especially in the defense area, it continues to support two-thirds of the Nation's basic research. This rather high ratio has remained virtually unchanged since the early sixties. One-half of the Government's basic research total supports activities at the Nation's universities and colleges.

In 1987, the Federal share of total national support for applied research is estimated at 43 percent. Industry provides more than one-half of the support for, and performs two-thirds of. the Nation's applied research.

Federal support of development is expected to reach 48 percent ($39.4 billion) of the national total; industry support is estimated at 52 percent ($42.3 billion) of all development expenditures. In 1987, industry is expected to account for 84 percent of the Nation's total development performance, while Federal intramural laboratories should spend 12 percent of the Nation's development funds. Industrial laboratories are expected to receive 37 percent of their development funds from Federal agencies.

# scientists and engineers

The United States relies heavily on its scientific and technological base for economic growth, national security, and international competitiveness. The increasing technological sophistication of the U.S. workforce evidences the essential role played by science and engineering (S/E) personnel in supporting that base. In 1986, there were about 2.4 million engineers and 2.2 million scientists employed in the United States. Of these 4.6 million, 85 percent—3.9 million—were engaged in S/E activities. Between 1976 and 1986, the employment of scientists and engineers grew at a combined annual rate of 7.1 percent. This growth occurred despite two recessions that adversely affected U.S. economic performance at the beginning of the eighties. During this 10-year period, employment of scientists and engineers increased more than three times as fast as total U.S. employment and about twice as fast as professional employment. The rapid increase in S/E personnel growth was primarily in response to growth in R&D expenditures; the pace of technological change, especially as it related to computer and electronics applications; and the need to increase productivity by improving U.S. manufacturing technology. As a result, S/E employment as a share of the U.S. employed civilian workforce rose from 2.6 percent in 1976 to 4.2 percent in 1986. The proportion of the U.S. workforce actually engaged in S/E jobs was 3.5 percent in 1986.

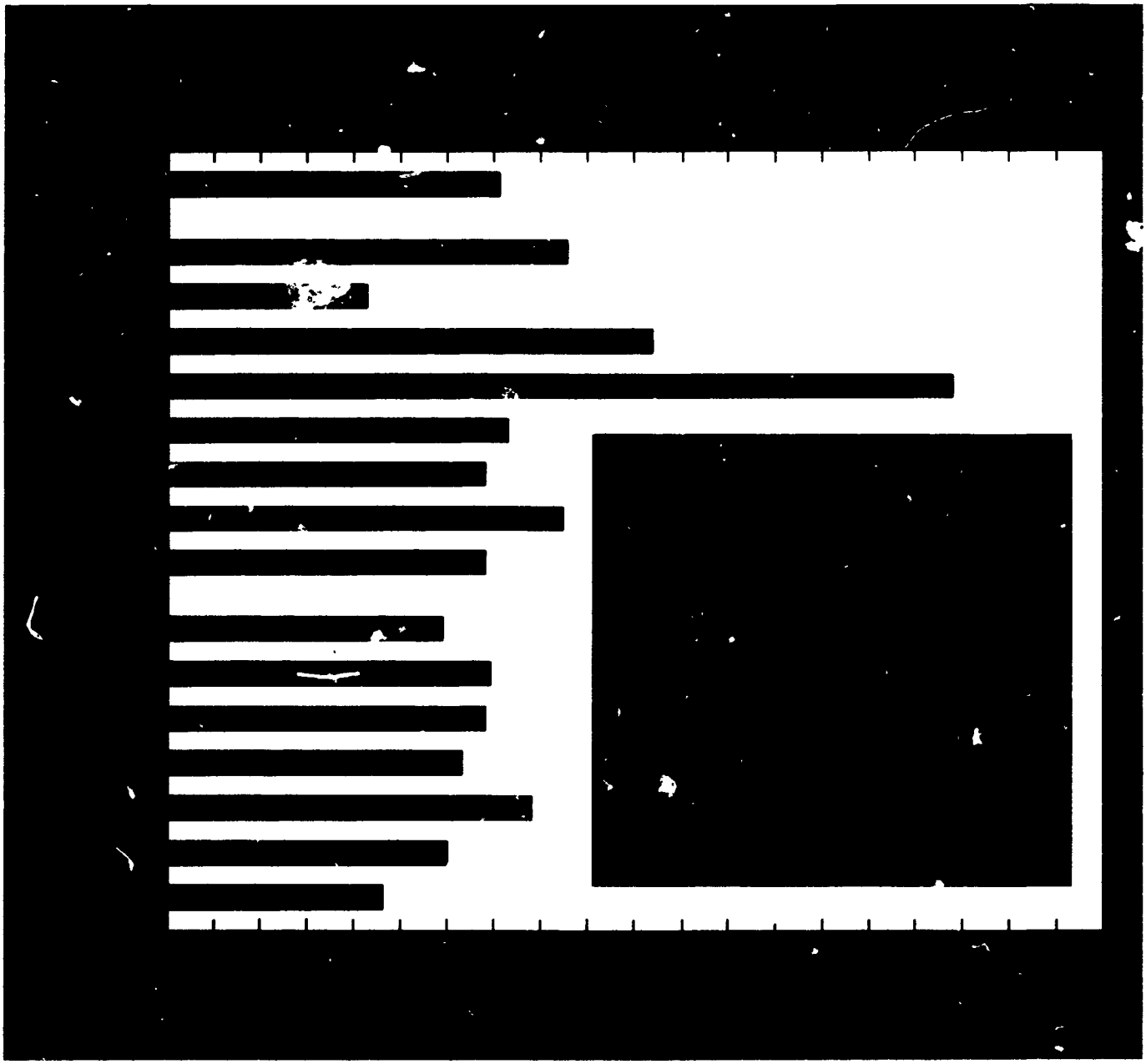
Although women made significant employment gains during the 1976–86 period, they continued to be underrepresented in science and engineering. In 1986, women accounted for 15 percent of total employed scientists and engineers—27 percent of all scientists and 4 percent of all engineers. In contrast, women comprised about 44 percent of the overall U.S. workforce and 43 percent of all professional employment. Between 1976 and 1986, employment of women scientists and engineers grew at an average annual rate of 13.3 percent. There is some indication that their rate of S/E employment growth has been slowing in recent years.

Minority groups (racial and ethnic) differ from each other with respect to their representation within the S/E workforce: blacks and Hispanics are underrepresented in S/E fields, whereas Asians' S/E employment share is much higher than their total workforce share.

S/E employment growth varies significantly between scientists and engineers and among various S/E fields. During the 1976–86 period, employment of scientists (including computer specialists) increased more rapidly than that of engineers, growing at annual rates of 8.6 percent and 5.9 percent, respectively (chart 4). (There is some indication that the slower rate of engineering growth may have resulted partially from supply constraints.) Computer specialties was the fastest growing science field, accounting for more than one-third of the total increase among scientists. Among engineering fields, employment of electrical/electronics engineers grew fastest. Together with mechanical engineering, this field accounted for almost one-half of the total 1976–86 job expansion for engineers.

Scientists and engineers report involvement in a variety of work activities. In 1986, for example, employed S/E personnel reported that they were engaged more in R&D activities (36 percent) than in any other type of work. Basic research accounted for 3 percent of primary work activities reported, applied research for 6 percent, development for 19 percent, and R&D management for 9 percent. Scientists and engineers were equally likely to have jobs in non-R&D management, accounting for about one-fifth of their respective 1986 primary work activity totals. By broad category, engineers were most likely to be employed in either development or production and related activities (including quality control). Scientists were most likely to be employed in research, teaching, or the combination of activities related to reporting, computing, and statistical work.

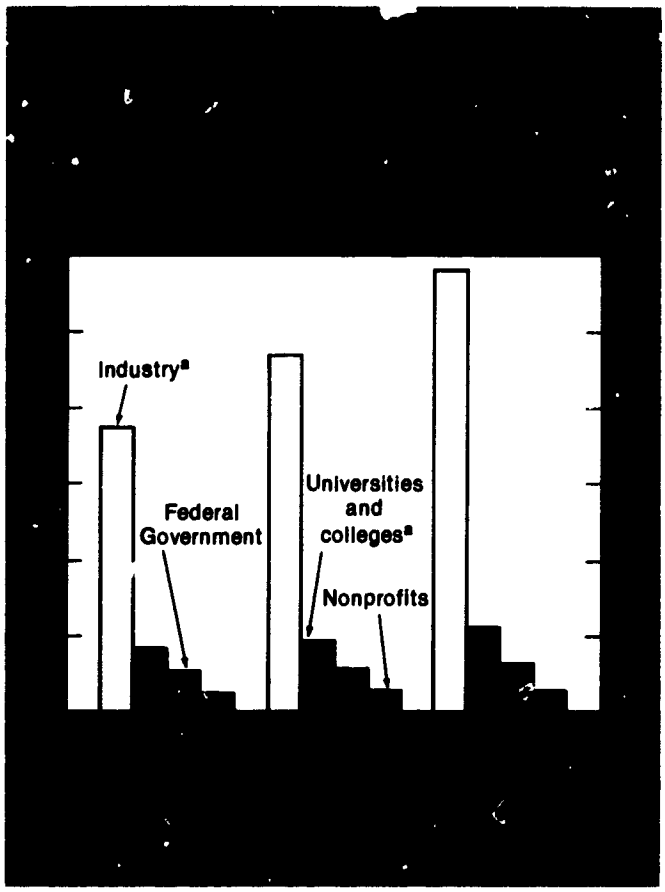
According to institutional performer-based surveys, the full-time equivalent of 802,300 scientists and engi-



neers were estimated to be employed on R&D activities in 1986. This is an increase of 4 percent over 1985 and about 50 percent over 1976; most of the growth occurred in the industrial sector (chart 5).

Industry and academia showed the strongest S/E employment growth between 1976 and 1986. The 8.0-percent average annual growth in industrial employment during this period raised industry's S/E employment share to two-thirds (3.1 million) of the total. Traditionally the major employer of U.S. engineers, industry is now—because of the rapid growth in demand for computer specialists—the primary employer of U.S. scientists as well. Academia, which in 1986 employed 14 percent (627,000) of S/E personnel, recorded 8.1 percent annual growth since 1976. Nearly 8 percent (354,000) of the S/E workforce is employed by the Federal Government; 5 percent (241,000) is employed by other levels of government. The relatively slow (5.2 percent) annual growth in total government S/E employment may have resulted, in part, from (1) the restrained growth in total Federal employment at the beginning of the eighties and (2) the slower growth in government engineering salaries as compared to those offered by industry.

Since the beginning of the eighties, the number of S/E baccalaureates has increased substantially, rising from 292,000 in 1980 to 324,000 in 1986. During this period, there was a significant shift in field distribution favoring engineering and computer science. Undergraduate degree production in both life and social sciences, however, declined substantially.




The number of master's and doctoral S/E degrees awarded in the United States also has increased significantly since 1980. In 1986, 62,500 master's and 18,800 doctoral degrees in S/E fields were awarded; these totals were up 15 percent and 9 percent, respectively, from 1980. The greatest increases in graduate level S/E degree production have been in computer science, physical sciences, and engineering fields.

Foreign student participation in U.S. S/E graduate degree programs has been increasing steadily. For example, in 1986, foreign students on temporary or permanent visas received 23 percent of doctorate degrees awarded in science, and 55 percent in engineering. In 1980, foreign student shares of S/E doctorates were 17 percent and 48 percent, respectively. After graduation, about one-half of foreign-student doctorate recipients have stated their intent to remain in the United States to pursue postdoctoral study or obtain employment.

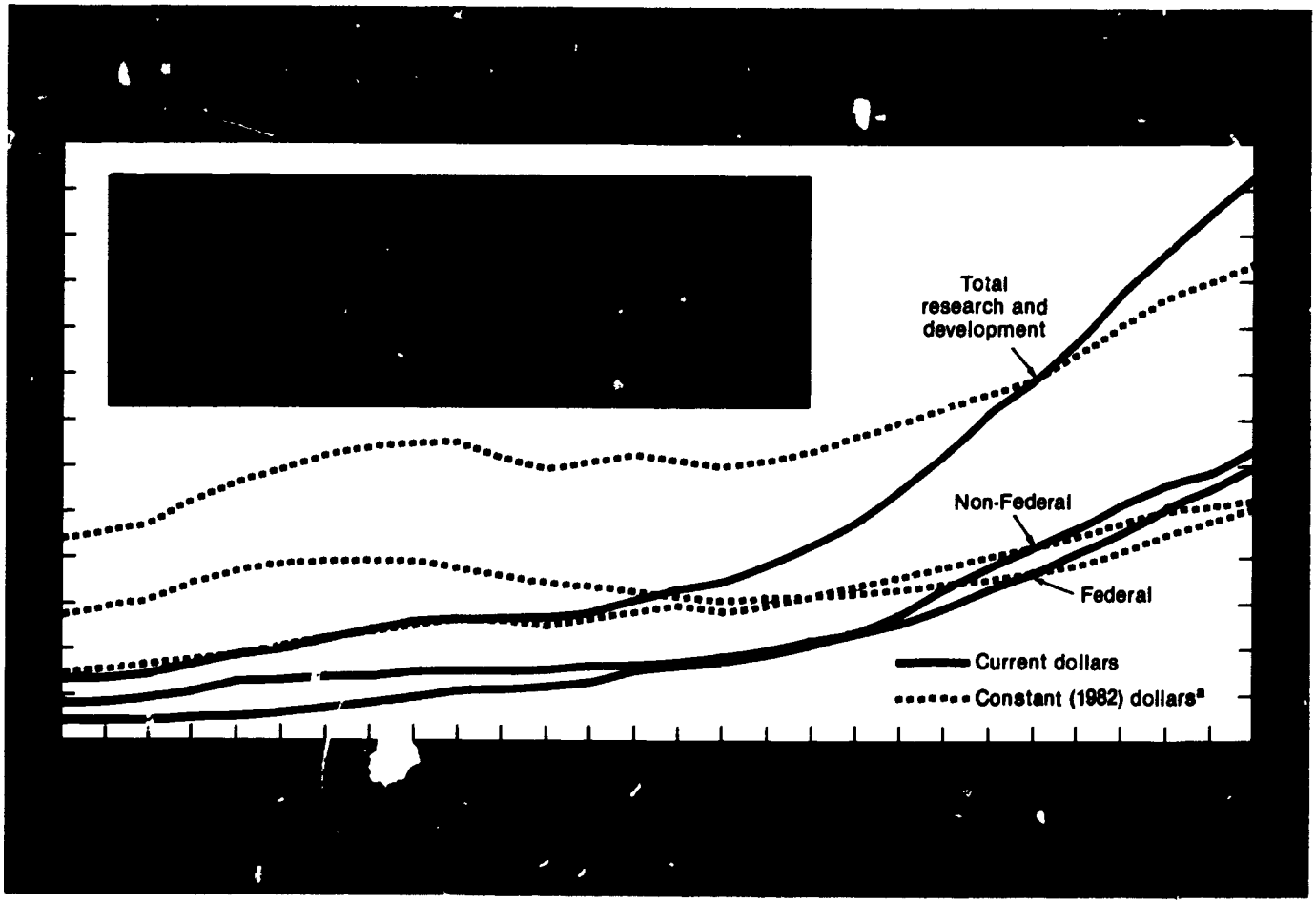
During the 1975–85 decade, employment growth of S/E doctorate-holders in the United States averaged 4.6 percent per year. The number of employed doctoral scientists has continued to outnumber doctoral engineers by five to one despite a relatively higher rate of growth in the number of engineering doctorates awarded. Within the sciences, differential growth rates have resulted in changing field distributions favoring computer specialists, social scientists, and psychologists. Within engineering, the highest rate of employment growth was reported for doctoral aeronautical/astronautical engineers, while the greatest absolute growth was in the number of employed Ph.D. electrical/electronics engineers. Between 1975 and 1985, there were three notable changes in employment characteristics of doctoral scientists and engineers: (1) teaching declined as a work activity in academia as more emphasis was placed on basic and applied research; (2) a high proportion of doctoral employment shifted to private industry (growing from about 25 percent in 1975 to more than 30 percent in 1985); and (3) an increasing share of S/E doctorate-holders were working in non-S/E jobs (9 percent in 1985, up from 6 percent in 1975).

# national perspectives of r&d resources

## r&d trends and the national economy

An estimated $114.7 billion was spent on U.S. research and development in 1986 by four principal sectors of the economy—Federal Government, industry, universities and colleges, and other nonprofit institutions (chart 6). This was a 7-percent increase from 1985 levels, or a 4-percent increase in constant dollars. In 1987, total R&D spending is expected to increase an additional 7 percent, or 4 percent in real terms.[3] This would be the twelfth

[3]Real growth for 1987 is derived by using the Office of Management and Budget GNP implicit price deflator estimate of 3.3 percent.

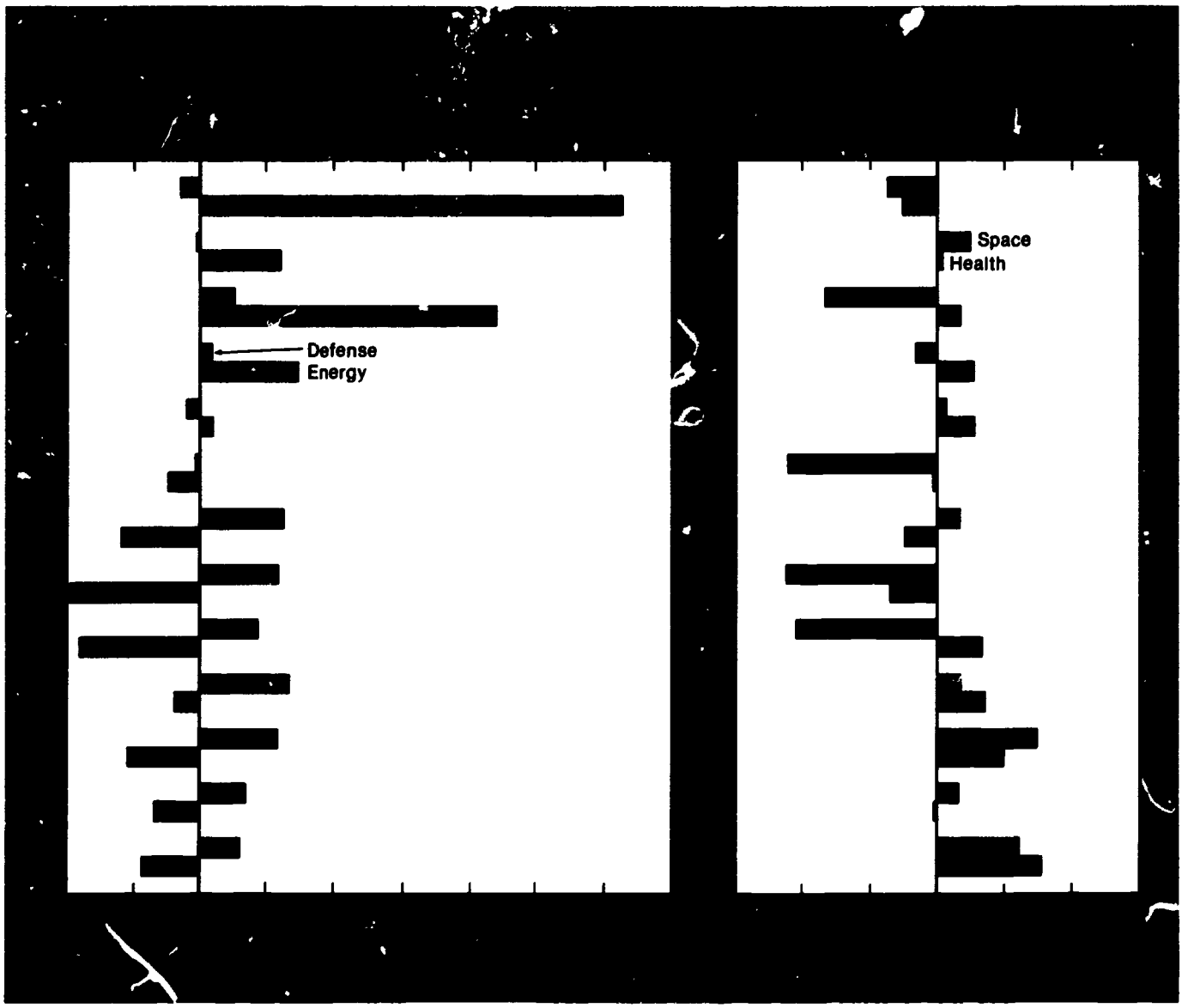


consecutive year of real-term increases in national R&D expenditures.

From 1967 until the late seventies, R&D growth had not kept up with overall increases in the economy: for nearly a decade, there had been no real growth in national R&D funding. Following the 1974 oil embargo and the 1975 recession, however, this situation ended as the Nation's R&D effort began a period of strong real-term growth that was heavily influenced by the search for solutions to the energy problem.

Between 1975 and 1980, national R&D expenditures grew at an average annual constant-dollar rate of 4.1 percent. During this period, non-Federal R&D support increased at three times the rate of Federal R&D support (6 percent annually versus 2 percent). Non-Federal increases were concentrated in industry, and largely resulted from greater emphases on energy conservation and improved use of fossil fuels. Additionally, Federal policies concerning regulations and minimum standards—particularly in such areas as food and drug production, environmental pollution, and public safety—served to increase and redirect industry R&D spending. Federal R&D increases, while partly the result of continuing defense expenditures, were largely attributable to the emphasis on energy-related research and development—particularly nuclear energy development—and to greater support for health-related research and development (chart 7).

Since 1980, Government R&D efforts have shifted primarily toward defense, which now accounts for 69 percent ($40.3 billion) of all Federal R&D expenditures. In fact, between 1980 and 1987, 90 percent of the increase in Federal R&D support is attributable to defense activities. Since 1983, Government R&D expenditures on both



health and space also have increased almost annually (chart 7). In 1987, for example, $6.6 billion is expected to be spent on Federal R&D health programs; 89 percent of this is to support biomedical research conducted by the National Institutes of Health (NIH). Federal support for health research and development is now second only to its support for defense-related research and development.[4]

In addition to increases in direct Federal support for research and development, there have been other Federal efforts to stimulate national R&D spending in the eighties. In 1981, for example, ERTA was passed. This Act provided additional tax credits to those companies that increased their R&D expenditures through calendar year 1985. Judged to have had at least moderate success in fostering industry research and development, the R&D credit provisions were extended through December 31, 1988, by the Tax Reform Act of 1986—although at a slightly reduced rate (20 percent, down from 25 percent) and for a somewhat narrowed and stricter definition of qualified research and development.

Concurrent with gains in Federal R&D spending, the private sector also has increased its R&D efforts, with spending up 38 percent—or $13.6 billion (constant 1982 dollars)—from 1980 levels. Non-Federal (largely industry) R&D support has increased in real terms at an average annual rate of 4.7 percent between 1980 and 1987. These R&D increases probably stem from both a growing perception of foreign competition in high-technology industries[5] and increased R&D spending by such defense-related industries as those manufacturing aircraft and missiles. Again, a small part of the increase in industry R&D spending may derive from the positive impact of ERTA and its successor.

The current 12-year growth pattern of industry R&D support has been both strong and durable. This is reflected by its survival through both the mild 1980 recession and the deeper 1982 recession. However, more recent data indicate a slowing in company funding of R&D activities through 1987 and beyond. Concern about future overall economic conditions; uncertain company sales and profit expectations; and the restructuring of R&D efforts after the recent large number of corporate takeovers, mergers, and reorganizations have all been cited as factors contributing to the probable slowing in the rate of industry's real R&D funding efforts.

# r&d performance

R&D performance by industry—including that performed by those federally funded research and development centers (FFRDCs) administered by industrial firms—accounts for 73 percent of the national R&D effort. In 1987, this sector is expected to expend $89.2 billion on R&D activities, an increase of 7 percent over the 1986 level of $83.6 billion, or a 3-percent increase in real terms (table 1 and chart 8).[6] Federal funds for research and development performed by industry are expected to increase by $2.8 billion; company-financed R&D performance, by $2.9 billion. Overall, the Federal Government is expected to fund about 36 percent of industry R&D performance in 1987.

In the late sixties, the Federal Government provided more than one-half the money spent by industry for R&D performance. By the midseventies, however, the Federal share had decreased to about 35 percent of the industry total. This decrease reflected Federal cutbacks in defense and space programs as well as the continued growth in R&D funding by industry itself. The Federal share continued to decline in the last half of the seventies, but at a slower rate, partially because of the new Federal emphasis on energy R&D programs. Between 1975 and 1980, company R&D funding increased at 2.5 times the constant-dollar rate of Federal R&D funds to industry (6.2 percent annually versus 2.4 percent); by 1980, the Federal share of industry R&D funding bottomed out at 31.5 percent. Since then, company funds for industry R&D performance have grown at an average annual constant-dollar rate of 4.6 percent; Federal R&D funds to industry—largely for defense but also for space and other nondefense programs—have increased 7.3 percent annually.

The Federal Government is historically the second largest R&D performer in the Nation, annually accounting for about 12 percent of U.S. R&D performance between 1980 and 1986. In 1987, its share is expected to increase slightly to 13 percent of the national R&D total, or $15.5 billion. This represents an increase of 14 percent from 1986 in current dollars, or 11 percent in constant dollars (chart 8).

Between 1970 and 1982, Federal intramural R&D performance in real terms remained relatively flat, as Federal R&D performance decreased from 16 percent of the national total to an estimated 12 percent. This relative reduction in Federal R&D performance was caused largely by cutbacks in space R&D programs. For example, between 1970 and 1982, National Aeronautics and Space

[4]National Science Foundation, *Federal R&D Funding by Budget Function Fiscal Years 1986–88* (NSF 87-305)(Washington, D C , March 1987)

[5]For example, data from the International Trade Administration show that in 1986 the United States imported more high-technology products ($75 1 billion) than it exported ($72.5 billion). This was the first time that the United States had experienced a trade deficit in high-technology products

[6]Industry R&D price deflators developed by Professor Edwin Mansfield of the University of Pennsylvania indicate that the GNP implicit price deflator may overstate real R&D spending by about 1 percent per year. ("Price Indexes for R and D Inputs, 1969–1983," *Management Science*, Vol. 33, No 1, January 1987, pp. 124–129 )

## Table 1. Intersectoral transfers of funds used for performance of research and development, basic research, applied research, and development: 1987 (estimated)

### RESEARCH AND DEVELOPMENT[1]

[Dollars in millions]

| Sources of funds | Performers | | | | | Total | Percent distribution, sources |
|---|---|---|---|---|---|---|---|
| | Federal Government | Industry[2] | Universities and colleges[3] | Associated FFRDCs[4] | Other nonprofit institutions[2] | | |
| Federal Government | 15,450 | 31,700 | 7,000 | 3,800 | 2,400 | 60,350 | 49.0 |
| Industry | — | [5]57,500 | 670 | — | 400 | 58,570 | 47.6 |
| Universities and colleges | — | — | 2,700 | — | — | 2,700 | 2.2 |
| Other nonprofit institutions | — | — | 780 | — | 650 | 1,430 | 1.2 |
| Total | 15,450 | 89,200 | 11,150 | 3,800 | 3,450 | 123,050 | 100.0 |
| | | | 14,950 | | | | |
| Percent distribution, performers | 12.6 | 72.5 | 9.1 | 3.1 | 2.8 | 100.0 | |
| | | | 12.1 | | | | |

### BASIC RESEARCH[1]

[Dollars in millions]

| Sources of funds | Performers | | | | | Total | Percent distribution, sources |
|---|---|---|---|---|---|---|---|
| | Federal Government | Industry[2] | Universities and colleges[3] | Associated FFRDCs[4] | Other nonprofit institutions[2] | | |
| Federal Government | 2,220 | 600 | 4,920 | 1,200 | 730 | 9,570 | 64.7 |
| Industry | — | [5]2,400 | 390 | — | 180 | 2,970 | 19.9 |
| Universities and colleges | — | — | 1,600 | — | — | 1,600 | 10.7 |
| Other nonprofit institutions | — | — | 460 | — | 250 | 710 | 4.7 |
| Total | 2,220 | 3,000 | 7,370 | 1,200 | 1,160 | 14,950 | 100.0 |
| | | | 8,570 | | | | |
| Percent distribution, performers | 14.8 | 20.1 | 49.3 | 8.0 | 7.8 | 100.0 | |
| | | | 57.3 | | | | |

[1]All data are estimated from reports by performers

[2]Expenditures for federally funded research and development centers (FFRDC's) administered by both industry and by nonprofit institutions are included in the totals of their respective sectors. They are estimated to account for less than 5 percent and 15 percent, respectively, of the industry and nonprofit institutions performance totals. FFRDCs are organizations exclusively or substantially financed by the Federal Government to meet a particular requirement or to provide major facilities for research and training purposes

## Table 1. Intersectoral transfers of funds used for performance of research and development, basic research, applied research, and development: 1987 (estimated)—Con.

### APPLIED RESEARCH[1]

[Dollars in millions]

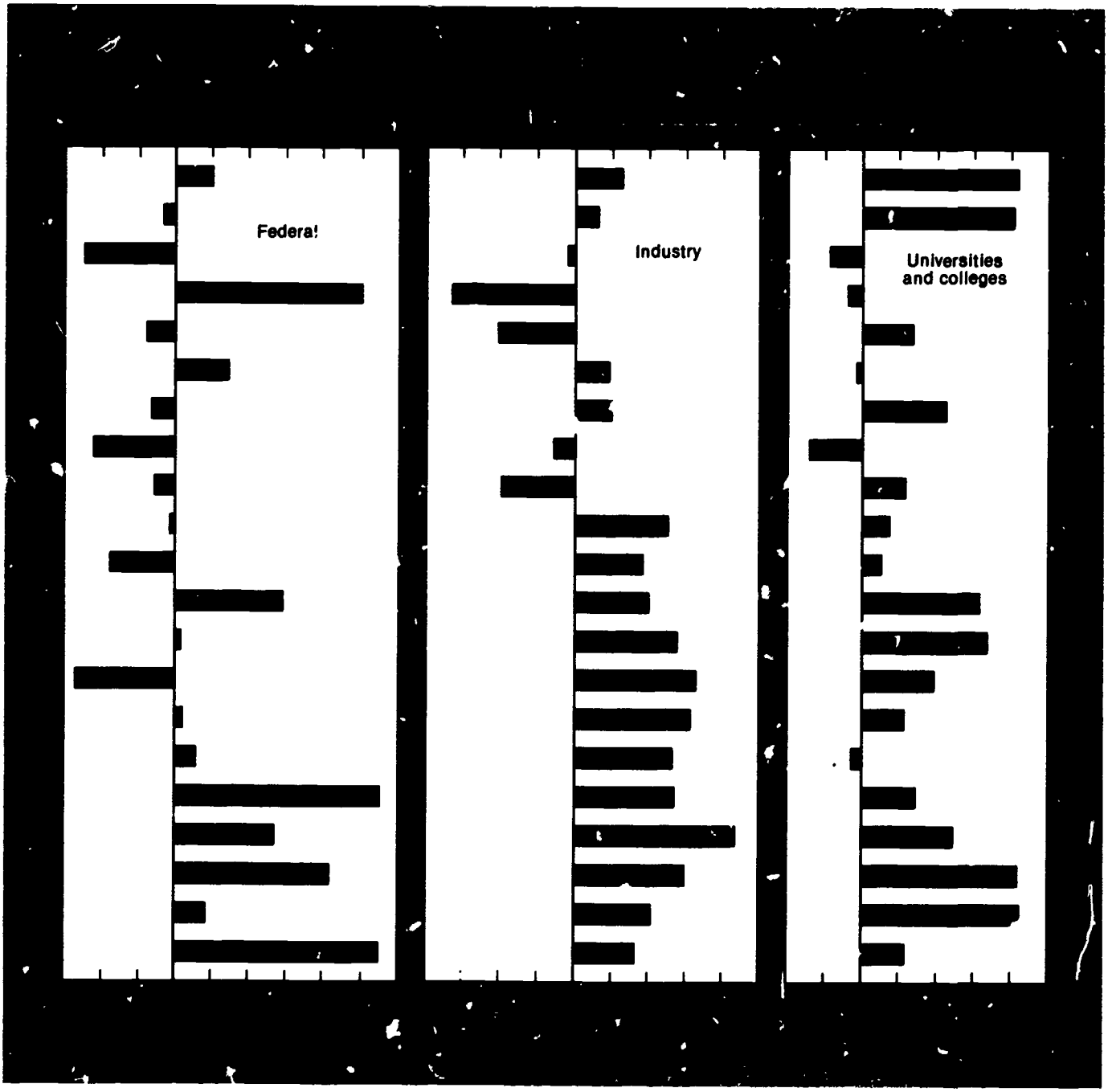
| Sources of funds | Performers | | | | | Total | Percent distribution, sources |
|---|---|---|---|---|---|---|---|
| | Federal Government | Industry[2] | Universities and colleges[3] | Associated FFRDCs[4] | Other nonprofit institutions[2] | | |
| Federal Government | 3,315 | 4,600 | 1,685 | 1,100 | 600 | 11,300 | 43.4 |
| Industry | — | [5]12,950 | 205 | — | 135 | 13,290 | 51.1 |
| Universities and colleges | — | — | 910 | — | — | 910 | 3.5 |
| Other nonprofit institutions | — | — | 280 | — | 230 | 510 | 2.0 |
| Total | 3,315 | 17,550 | 3,080 | 1,100 | 965 | 26,010 | 100.0 |
| | | | 4,180 | | | | |
| Percent distribution, performers | 12.7 | 67.5 | 11.8 | 4.2 | 3.7 | 100.0 | |
| | | | 16.1% | | | | |

### DEVELOPMENT[1]

[Dollars in millions]

| Sources of funds | Performers | | | | | Total | Percent distribution, sources |
|---|---|---|---|---|---|---|---|
| | Federal Government | Industry[2] | Universities and colleges[3] | Associated FFRDCs[4] | Other nonprofit institutions[2] | | |
| Federal Government | 9,915 | 26,500 | 395 | 1,500 | 1,070 | 39,380 | 48.0 |
| Industry | — | 42,150 | 75 | — | 85 | 42,310 | 51.1 |
| Universities and colleges | — | — | 190 | — | — | 190 | .2 |
| Other nonprofit institutions | — | — | 40 | — | 170 | 210 | .3 |
| Total | 9,915 | 68,650 | 700 | 1,500 | 1,325 | 82,090 | 100.0 |
| | | | 2,200 | | | | |
| Percent distribution, performers | 12.1 | 83.6 | .9 | 1.8 | 1.6 | 100.0 | |
| | | | 2.7 | | | | |

[3]Includes agricultural experiment stations
[4]Federally funded research and development centers (FFRDCs) administered by individual universities and colleges and by university consortia
[5]Includes State and local government funds
SOURCE: National Science Foundation, SRS




Administration (NASA) funds for intramural R&D performance decreased by more than one-half in real terms. Since 1983, however, real-term increases in Federal defense spending have kept the Federal intramural share of national R&D expenditures at 12 percent.

In 1987, the Department of Defense (DOD) is expected to have a 15-percent increase in intramural R&D expenditures, to $10.2 billion.[7] All other Federal agencies are expected to spend $5.2 billion on intramural research

[7]Estimates are for fiscal year 1987 Federal intramural obligations, and cover costs associated with planning and administering intramural and extramural R&D programs by Federal personnel as well as actual intramural R&D performance. National Science Foundation, *Federal Funds for Research and Development: Fiscal Years 1986, 1987, and 1988*, Volume XXXVI (Detailed Statistical Tables)(NSF 87-314)(Washington, D.C., 1987)

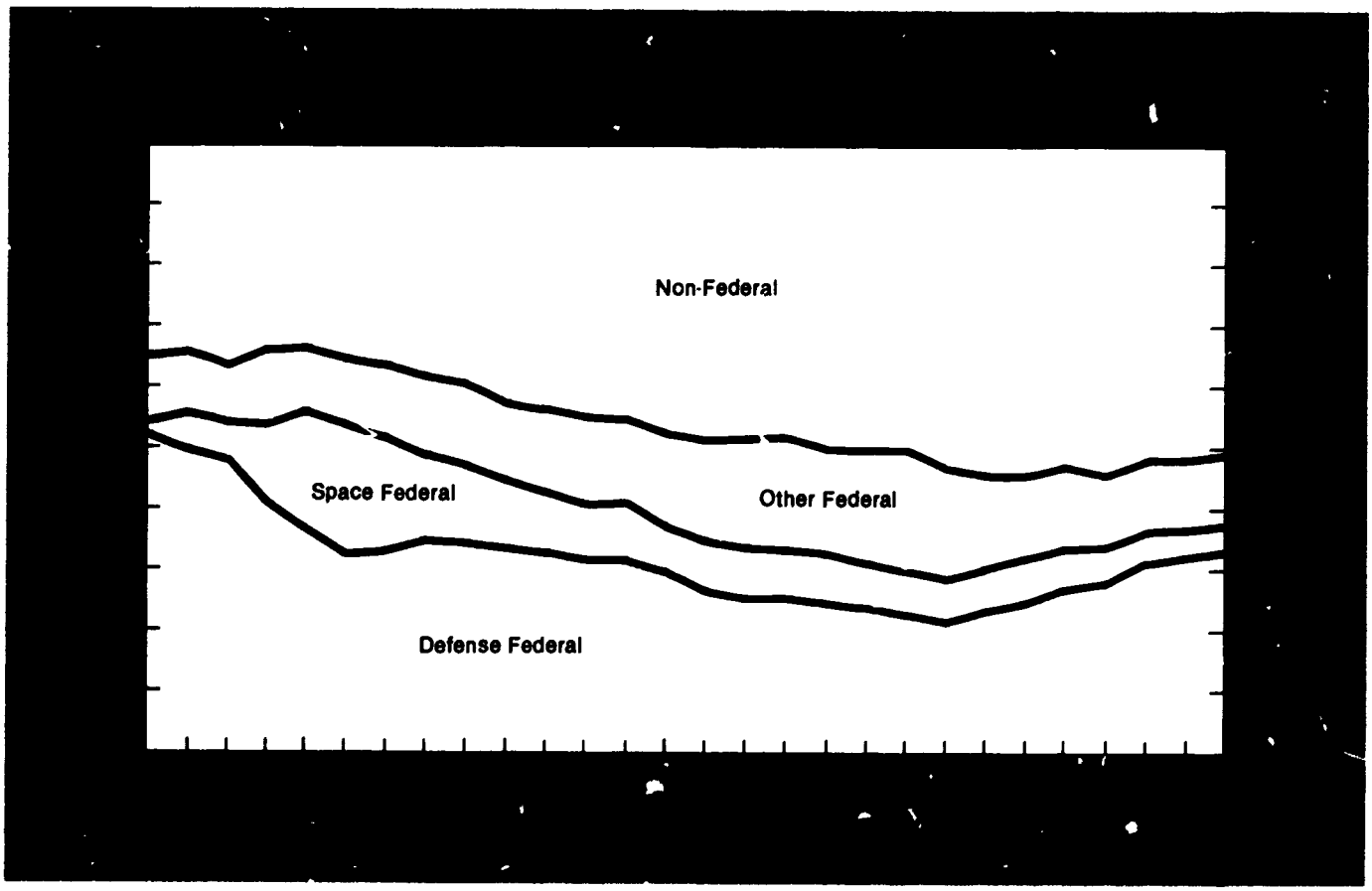
and development, which is a 12-percent increase over 1986 levels. Of nondefense Federal agencies, only NASA ($1.5 billion) and NIH ($1.1 billion) are expected to spend more than $1 billion. These represent increases of 20 percent and 11 percent, respectively, from 1986 intramural R&D expenditures.

Universities and colleges (excluding academically administered FFRDCs) account for an additional 9 percent of the national R&D performance effort. R&D performance by this sector is estimated to reach $11.2 billion in 1987, a 5-percent increase from 1986 (2 percent when adjusted for inflation). Between 1975 and 1980, university and college R&D performance increased by 21 percent in constant dollars (3.8 percent annually), but fell off to a 1.6-percent average annual rate between 1980 and 1983. This leveling reflected cutbacks in Federal funding, particularly in the health area, and the slow (0.3 percent) annual growth in State and local real-dollar funding of universities and colleges. Since 1983, real increases from Federal support sources have resulted in an estimated 26-percent rise through 1987 (an average annual increase of 6 percent). Federal Government agencies fund about two-thirds of academic R&D performance.

In 1987, R&D performance by university- and college-administered FFRDCs is estimated at $3.8 billion; this would account for 3 percent of the national R&D effort. Taken together, research and development performed by universities and colleges and by academically administered FFRDCs account for an estimated 12 percent of the Nation's 1987 R&D performance. Between 1974 and 1980, university- and college-associated FFRDCs increased their R&D performance by 60 percent in constant dollars. This increase in FFRDC performance largely mirrored the Federal emphasis on energy programs. Since 1980, the Federal shift from energy to defense has resulted in an estimated constant-dollar increase of 21 percent, one-third the previous 6-year gain.

# research and development by national objective

Historically, the Nation's largest R&D spending area has been defense (chart 9). In the early sixties, more



than one-half of total national R&D expenditures was in this area. By the late sixties, however, relative Federal R&D defense spending had declined substantially, while industry funding in civilian areas had begun to increase.[8] Defense research and development consequently fell to less than 30 percent of the national R&D effort by the midseventies; by 1980, defense was as low as 22 percent. Since then the defense share has been increasing and is expected to reach 33 percent of the national total in 1987. Most of the remaining national R&D effort in 1987 is expected to be for health, space, and other civilian and nondefense areas.

# the federal r&d funds/ total budget funds ratio

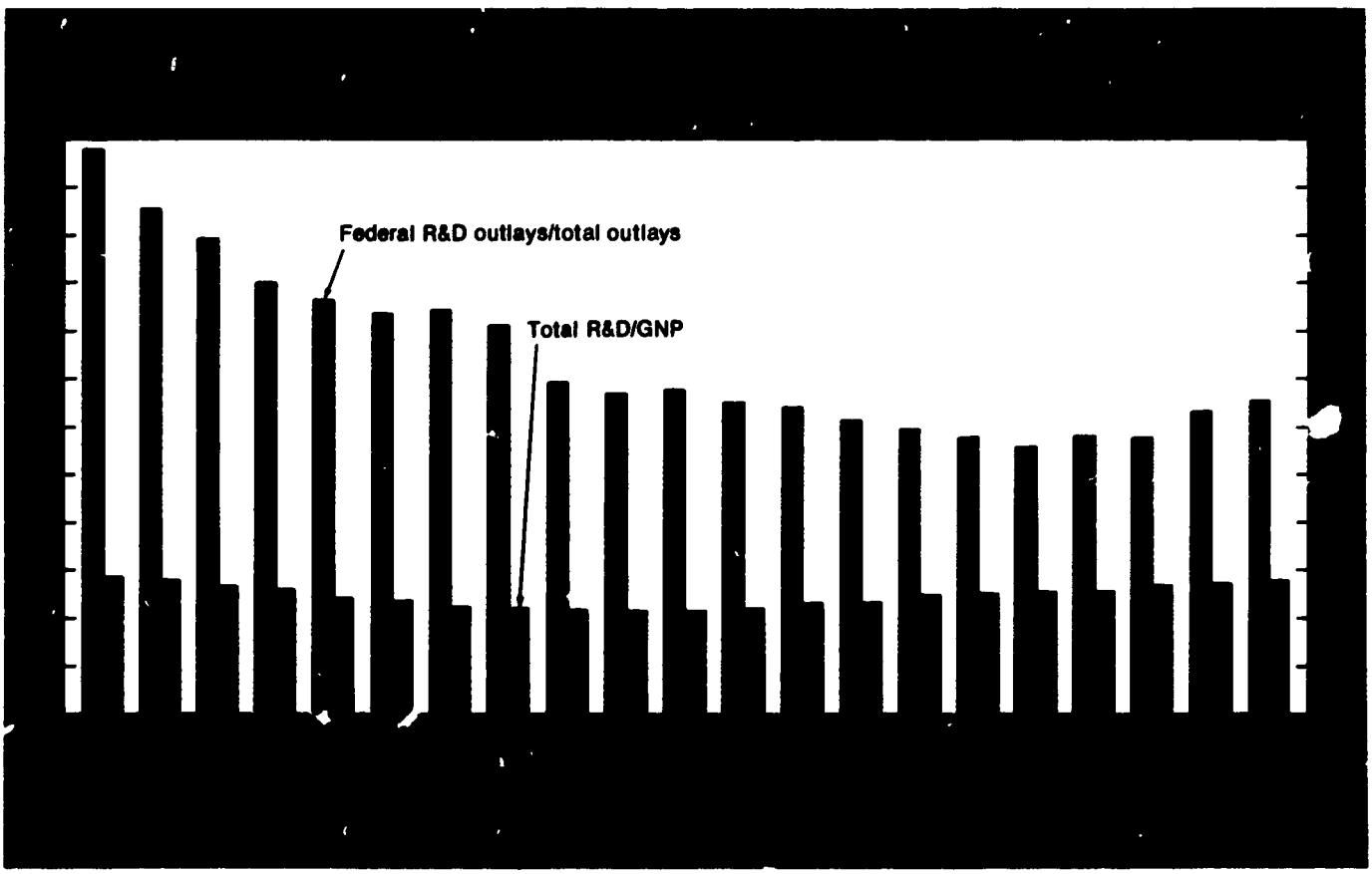
One way to gauge the Government's priority for research and development is to compare Federal outlays for research and development with total Federal outlays for all purposes. In 1987, total Federal outlays (for on-budget programs only) are estimated at $821 billion.[9] Outlays for research and development are estimated at $53 billion, or 6.5 percent of the total; this is up slightly from the 1986 ratio of 6.3 percent (chart 10).

Between 1967 and 1983, R&D outlays as a percentage of total outlays declined steadily, dropping from 11.7 percent to 5.5 percent. The rate of decline, however, was most rapid in the late sixties and early seventies and then slowed considerably from 1975 on. Part of the initial decline (1967–74) in the R&D outlay ratio is explained by the general deemphasis on research and development that prevailed before the first oil embargo; part undoubtedly stemmed from a reduction in defense expenditures with their relatively large R&D component.

By comparison with this earlier period, R&D outlays pretty much held their own during the mid- and late seventies when budget-wide outlay increases were growing rapidly. This in itself is a good indication of the

[8]All industry-funded research and development is classified as civilian research and development, including expenditures by aerospace and electronic industries.

[9]Almost all off-budget receipts and disbursements are for Social Security programs (the Federal Old-Age and Survivors Insurance and the Federal Disability Insurance trust funds) which are excluded from the budget totals by the Balanced Budget and Emergency Deficit Control Act of 1985. Off-budget outlays for fiscal year 1987 are estimated at $194 billion.



higher priority accorded R&D funding after 1974. Between 1984 and 1987, the R&D outlay ratio began to increase to its current 6.5-percent level.

In terms of budget function,[10] research and development in 1987 is estimated to account for 14 percent of Federal defense spending and 3 percent of total Federal nondefense funds (table 2). In nondefense areas, research and development is expected to account for 16 percent of health funds, 34 percent of space funds, and more than 80 percent of funds for both energy and general science. For all other Government functions, research and development represents only about 0.5 percent of the total. The major factor behind the high R&D/total funds ratio for energy is that, since the early eighties, energy funds increasingly have been directed to basic and applied research on energy science activities providing knowledge for future energy technologies.[11]

**Table 2. Estimated budget authority for research and development as a percent of total Federal budget authority by function: 1987**

**[Dollars in millions]**

| Function | R&D total | Federal total | R&D percent share |
|---|---|---|---|
| Total budget | $58,148 | $1,093,933 | 5.3% |
| On budget | 58,148 | 879,915 | 6.6 |
| National defense | 40,260 | 292,927 | 13.7 |
| Non-defense (on-budget) | 17,888 | 586,988 | 3.0 |
| Energy | 2,155 | 2,637 | 81.7 |
| Health | 6,608 | 40,262 | 16.4 |
| General science | 2,041 | 2,345 | 87.0 |
| Space research and technology | 3,344 | 9,809 | 34.1 |
| Natural resources and Environment | 1,083 | 13,241 | 8.2 |
| All other | 2,657 | 518,694 | .5 |

SOURCES: National Science Foundation, SRS and Office of Management and Budget

# the r&d/gnp ratio

The R&D/GNP ratio, which is a measure of the total Nation's commitment to research and development, has been more stable than the Federal research and development/total funds ratio. In 1987, total U.S. R&D expenditures ($123 billion) are expected to equal 2.7 percent of the Nation's GNP ($4.49 trillion), a ratio largely unchanged from 1986 levels (table B-15).

After peaking at 2.9 percent in 1964, the R&D/GNP ratio declined gradually to 2.1 percent in 1978. This drop reflected Federal cutbacks in defense and space R&D programs during a period when the GNP continued to increase. Gains in R&D energy activities between 1975 and 1979 resulted in a relative stabilization of this ratio at around 2.1 percent to 2.2 percent. Since then, the ratio has increased steadily from 2.2 percent in 1979 to 2.7 percent in 1987. A large part of this increase, however, resulted as much from a slowdown in GNP growth as from increased spending on R&D activities. For example, the recessions during 1980 and 1982 resulted in a slight decline in real GNP between these 2 years. Since that time, the Nation's real GNP has increased at an average annual rate of 3.8 percent. Spending for research and development has increased at about 5 percent annually in real terms.

# basic research, applied research, and development

Between 1975 and 1980, national spending on basic research, applied research, and development increased at average annual constant-dollar rates of 3.6 percent, 4.2 percent, and 4.2 percent, respectively. These were up substantially from the rates that prevailed between 1967 and 1975: −0.8 percent for basic research, 0.1 percent for applied research, and −1.2 percent for development. Federal support of basic research during the 1975–80 period went up in real terms at a faster rate (3.8 percent annually) than did Federal support for either applied research (2.7 percent) or development (1.5 percent). The annual gains in non-Federal support were greatest in development (6.5 percent) and applied research (5.6 percent). Non-Federal support for basic research increased during this period by 3.3 percent annually.

Data and estimates for the 1980–87 period show the largest Federal constant-dollar growth was for development activities (7.4 percent annually); this reflects increased defense spending. Federal funding of basic and applied research for the period grew at average annual rates of 3.1 percent and 4.1 percent, respectively. Non-Federal support increased in all areas during the 1980–87 period. Real non-Federal growth averaged 6.1 percent annually for basic research, 5.3 percent for applied research, and 4.3 percent for development. In 1987, 12 percent of total national R&D expenditures are for basic research, 21 percent for applied research, and 67 percent for development.

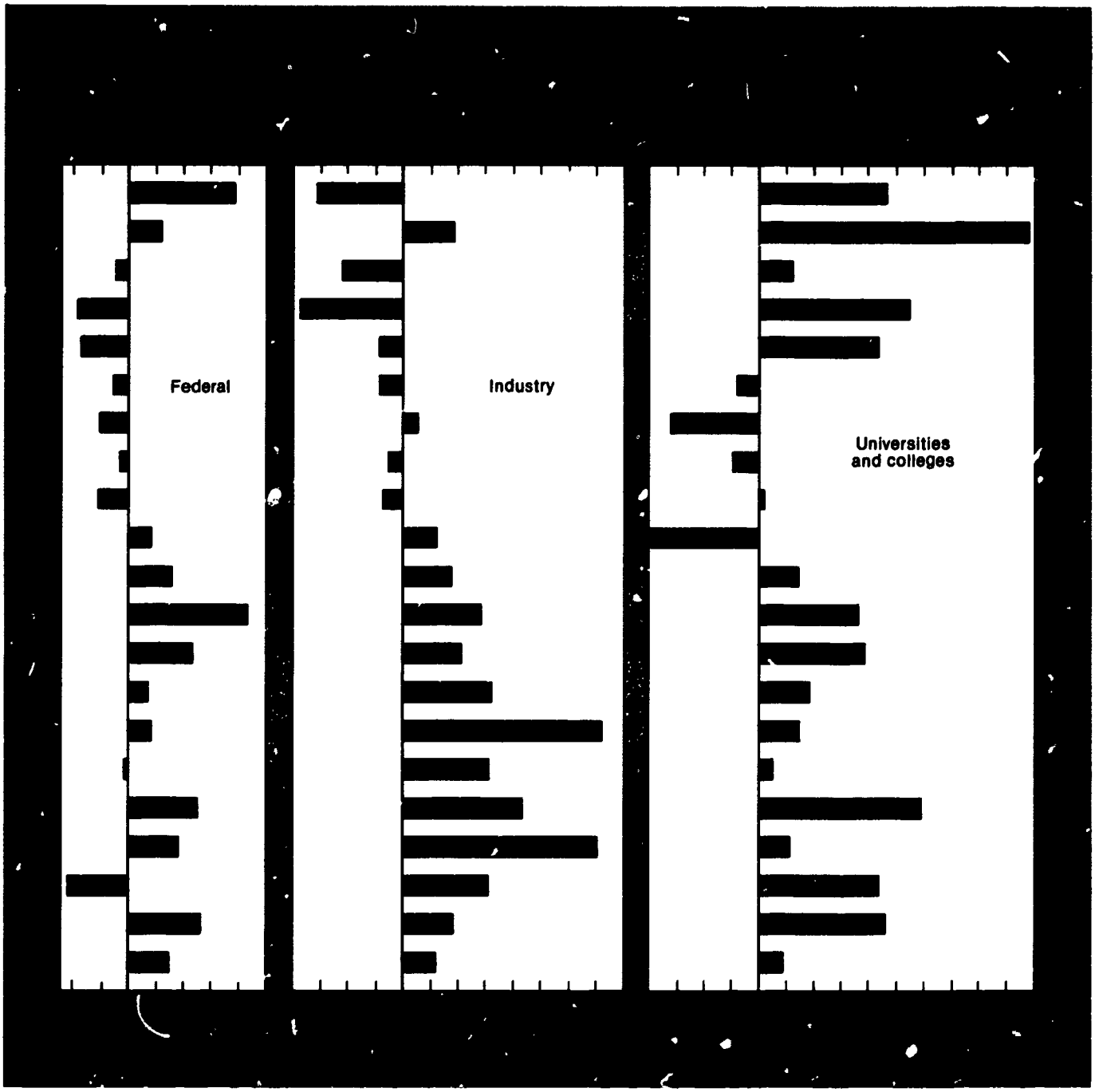
[10]Ratios are for on-budget authorizations.

[11]Office of Management and Budget, *Budget of the United States Government, Fiscal Year 1988, Supplement* (Washington, D.C.: Supt of Documents, U S Government Printing Office, 1987).

# basic research

In 1986, total spending on basic research amounted to an estimated $14.2 billion, a gain of 8 percent over 1985—5 percent in real terms. This growth continued an upward trend that began in 1976 and resulted in a 55-percent funding increase (constant dollars) during the 10-year period. Federal support increased 44 percent between 1976 and 1986, while the smaller non-Federal support for basic research rose by 79 percent (chart 11).

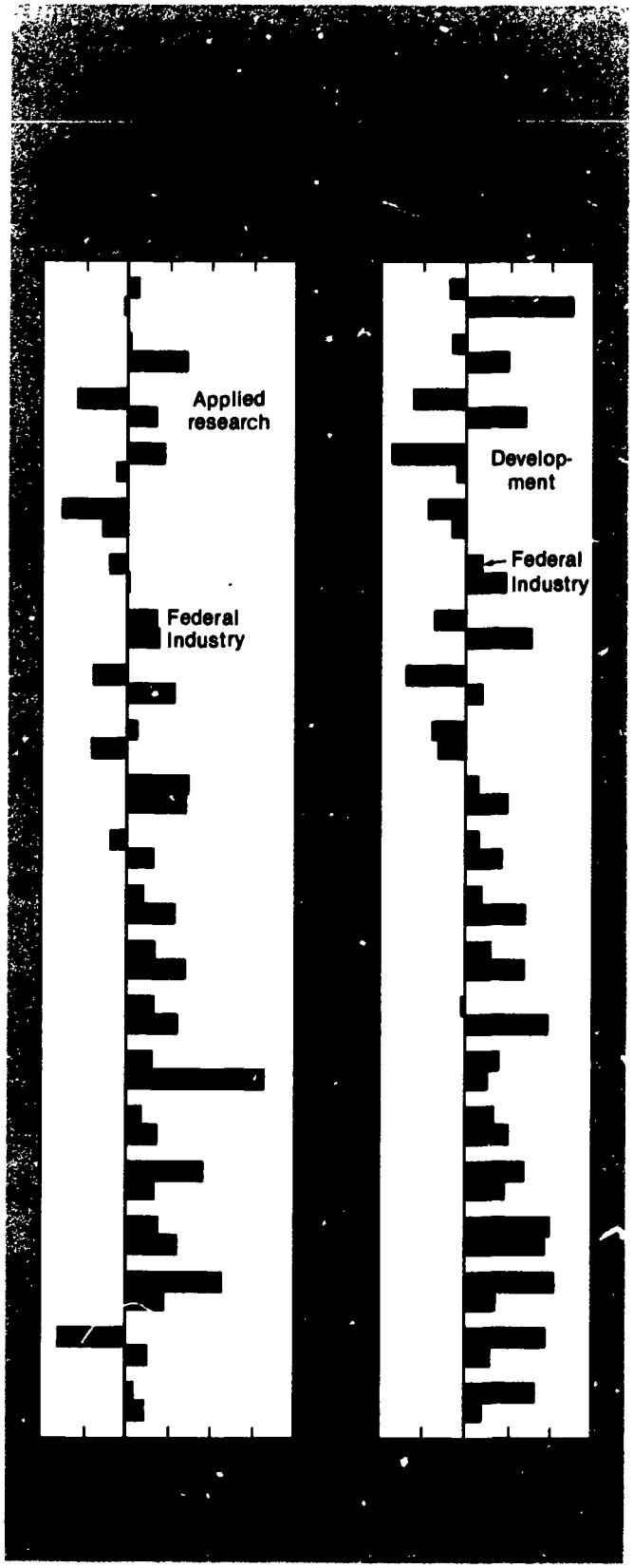
In 1987, the increase in national basic research spending is expected to slow to 6 percent (to $15 billion), or 2 percent in real terms. Non-Federal basic research support should increase an estimated 2 percent in real terms, while constant-dollar Federal support should be 3 percent more than that provided in 1986. The Federal Government supports approximately 65 percent of the Nation's expenditures on basic research; it performs 15 percent of same.



The second largest supporter of basic research, the industrial sector, accounts for more than one-fifth of the national total. In 1987, industry support of basic research is expected to reach $3 billion, 6 percent more than in 1986 (2 percent after adjustment for inflation). Between 1975 and 1987, industrial support increased at an average annual constant-dollar rate of 6.4 percent. This growth followed a 9-year period during which industrial spending for basic research fell at an average annual rate of 2.3 percent (chart 11). Over this period, 1967–75, R&D managers placed more stringent controls on R&D activities by mandating that such projects have clearly defined objectives. Consequently, many basic research projects were postponed or canceled in favor of more immediate product- and process-oriented activities. In the midseventies, renewed optimism about the long-range potential of basic research—particularly in energy-related areas—was a major factor in reversing this earlier trend.

In 1987, universities and colleges are expected to spend $1.5 billion of their own funds on support of basic research. Other nonprofit organizations are expected to contribute an additional $0.7 billion during the year.

Although universities and colleges support only 10 percent of national basic research funding, they perform one-half of such work. Two-thirds of their basic research funding comes from the Federal Government, primarily NIH and the National Science Foundation. In 1987, universities and colleges are expected to perform $7.4 billion of basic research, up 4 percent from 1986 levels (1 percent in real terms). This small increase represents a substantial slowing from the rapid growth in university and college basic research performance of the previous 2 years; during that time, spending rose 19 percent in constant dollars. Industry support of basic research in universities and colleges is expected to amount to $390 million in 1987, a 4-percent increase from 1986 levels. Five years earlier, industry's support of basic research in universities and colleges was only one-half this amount ($198 million).




## applied research

National spending on applied research is expected to reach $26 billion in 1987. This figure is 5 percent more than in 1986, or—in real terms—a 2-percent gain. After adjustment for inflation, Federal support is expected to increase by 1 percent, after having fallen by 8 percent in 1986. This was the first such decline in Federal applied research funding since 1977 (chart 12). The decline stems mostly from DOD's reduction in relative support for research in favor of support for development activities. Industrial support for applied research is estimated to increase in 1987 by 6 percent (2 percent in real terms).

Between 1975 and 1987, national applied research spending grew at an average annual constant-dollar rate of 4.2 percent. Average annual increases in industrial support of 5.5 percent (constant dollars) during this period accounted for most of this growth. Federal support during the same period grew in real terms by 2.9 percent annually; it is estimated to account for 43 percent of the Nation's support for applied research.

Two-thirds of the Nation's applied research is performed within industrial laboratories. Nearly three-fourths of the money spent on industrial applied research is provided out of companies' own funds; the remainder is from Federal sources. In 1987, expenditures for applied research in industry are expected to reach $17.6 billion, 5 percent more than in 1986. After adjusting for inflation, industrial applied research performance is up 2 percent in 1987; it had fallen 4 percent in 1986. These increases compare with 8.8-percent average annual real-term growth registered between 1979 and 1985. Annual growth was never less than 6.8 percent during this period. The 1986 and 1987 figures reflect a recent shift in greater industrial commitment to development, rather than research, efforts.

At an estimated $3.3 billion in 1987, the Federal Government continues to be the second largest performer of applied research in the Nation. This figure is a 6-percent increase from 1986, or 3 percent in real terms. Between 1976 and 1986, Federal applied research performance had diminished by 20 percent in real terms, mainly because of cutbacks at NASA where spending decreased by one-half in constant dollars. NASA performed 30 percent of total Federal intramural applied research in 1976; in 1986, its share was 17 percent of the Federal total. In 1987, NASA's share is estimated to be back up to 19 percent of this intramural total.

## development

In 1987, national spending on development amounted to an estimated $82.1 billion, or two-thirds of national expenditures on total R&D activities. These expenditures represent an 8-percent increase in development support over 1986 (5 percent in real terms). Industry provides 52 percent ($42.3 billion) and the Federal Government 48 percent ($39.4 billion) of the development support in the Nation. Both of these sources have been increasing their development spending in real terms since 1975. Industry support increased at four times the rate of Federal through 1980: 6.5 percent annually versus 1.5 percent. Since then, however, Federal support for development has increased faster than has industry's primarily because of Government's increased funding for defense programs. Federal support has increased at an average annual 7.4-percent constant-dollar rate between 1980 and 1987, compared to a 4.3-percent annual rate of growth in industrial development support (chart 12).

Industry is estimated to account for nearly 84 percent ($68.7 billion) of the Nation's total 1987 development performance. Company expenditures for applied research and development activities are concentrated in six major R&D-performing industries—electrical equipment, machinery, chemicals and allied products, motor vehicles and motor vehicles equipment, professional and scientific equipment, and aircraft and missiles.

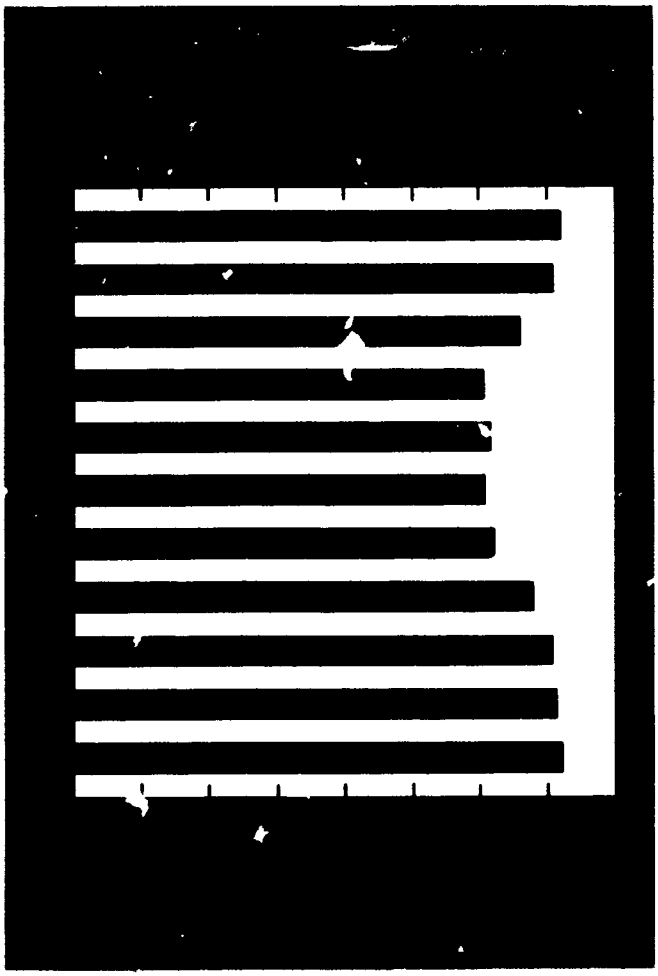
Government is the Nation's second largest performer of development activities, with about 12 percent of the total in 1987. In real terms, Federal development performance has increased at an average annual rate of 8.7 percent since 1980. Industry development performance increased at three-fifths that rate (5.3 percent) during the same period. More than 90 percent of the Federal Government's intramural development performance is estimated for defense in 1987, compared with 75 percent of its total in the midseventies. Similarly, Federal support to industry in 1987 for defense development activities is expected to account for more than 90 percent of total Federal industrial development funding, compared to two-thirds this total a decade earlier.

# full-time-equivalent (fte) r&d scientists and engineers

In 1986, the full-time equivalent of 802,300 scientists and engineers were estimated to be employed on R&D activities in the United States. This was an increase of about 4 percent from the 1985 level of 772,500, and about 50 percent more than the 1976 figure (chart 13). Three-fourths were employed by industry in 1986; universities and colleges (14 percent) and the Federal Government (8 percent) employed most of the rest. Throughout the midseventies, for every 10,000 persons employed in the civilian labor force, approximately 61 were FTE R&D scientists or engineers. Continued increases in national R&D funding have caused this ratio to increase since 1979 to its 1986 level of 73 per 10,000.

Between 1975 and 1981, real R&D expenditures for industrial research and development correlated closely with annual changes in the number of FTE R&D scientists and engineers employed by industry. Beginning in 1982, however, such R&D spending has tended to increase at a somewhat faster pace than has this measure of industrial R&D employment. Primary reasons cited for this change in industry's R&D spending/employment relationship are (1) the increasing use of R&D budgets

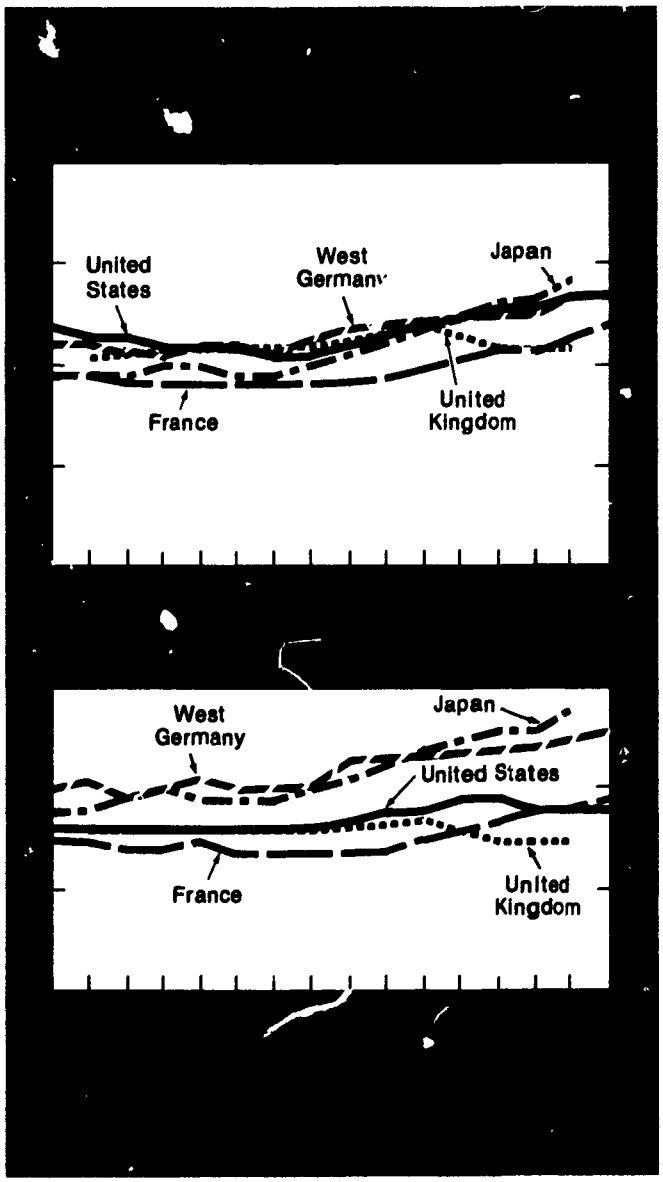
to purchase advanced technological equipment and instrumentation systems; and (2) higher company salaries for R&D scientists and engineers.



# international comparisons

The relative emphasis countries place on R&D activities can be determined by several methods. The two most commonly used are (1) comparison of R&D expenditures with GNP and (2) comparison of R&D scientists and engineers with the labor force. These ratios overcome much of the difficulty of interpretation produced by inflation, exchange rate fluctuations, different unit costs, and differences in the volume of research efforts. Nonetheless, because of variances in the manner in which countries compile R&D data, caution still must be exercised in making international comparisons.

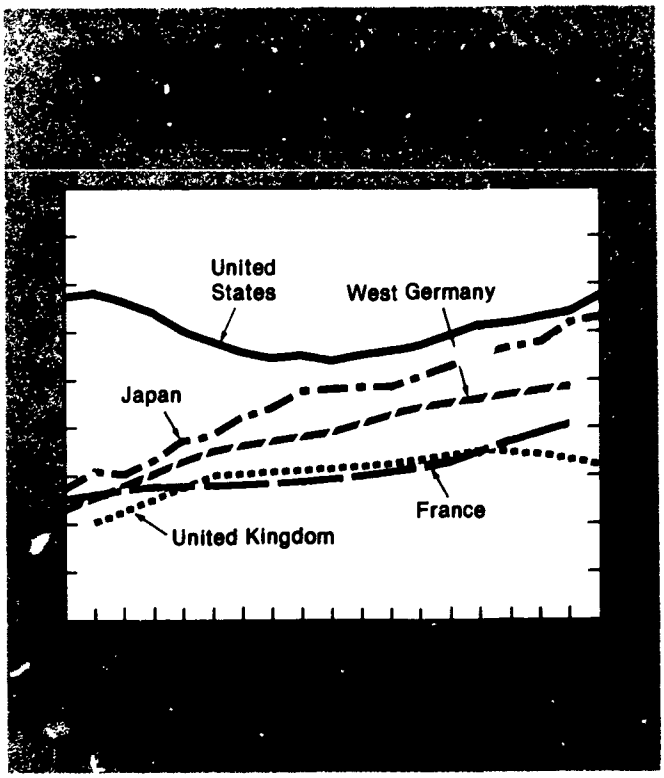
The United States spends more money on R&D activities than any other country; it spends more than France, West Germany, the United Kingdom, and Japan combined. During the early and midsixties, the United States also had the highest R&D/GNP ratio: almost 3 percent. After 1964, however, the U.S. ratio began to decline—largely because of cutbacks in Federal R&D spending for defense and space—while the GNP continued to increase. At the same time, the ratios in other countries—notably West Germany and Japan—increased, primarily as a result of large gains in government R&D funding. These divergent trends continued until the midseventies, at which point the U.S. ratio had dropped to 2.1 percent and was about equal to those in West Germany, the United Kingdom, and Japan (chart 14).



By the late seventies and early eighties, the ratios in all countries were again increasing. In 1985, for example, the U.S. ratio had risen to 2.7 percent, about equal to the ratios in West Germany and Japan.

Excluding defense activities from the R&D data presents a somewhat different picture. For example, the resulting nondefense R&D/GNP ratio for the United States in 1985 (1.8 percent) was considerably lower than those for West Germany (2.5 percent) and Japan (2.8 percent). Seventy percent of the U.S. R&D effort was spent on nondefense activities as compared with more than 90 percent in these two countries. Thus, when only the civilian R&D/GNP ratio is considered, West Germany and Japan have been ahead of the United States for 15 years, and their rate of civilian R&D investment as a percentage of GNP has been rising faster than the United States' for the past 5 years. In terms of the nondefense R&D/GNP ratio, France has been catching up to U.S. levels, especially in the eighties; the United Kingdom apparently has been falling behind (chart 14).

Comparing the number of FTE R&D scientists and engineers with the labor force results in a ratio higher in the United States than in the other industrialized market economies. According to 1985 data, there were about 67 R&D professionals per 10,000 in the U.S. labor force (chart 15).[12] The ratio in the United States has been increasing each year since 1976. The ratios in most other countries also have been increasing annually since the sixties, especially in Japan. Currently there are about 63




R&D professionals per 10,000 workers in Japan's labor force; this is close to the U.S. ratio. In the late sixties, the Japanese ratio was only one-half the R&D/labor force ratio for the United States. The other countries' ratios are substantially lower (30 to 50 FTE R&D professionals per 10,000) than the U.S. ratio.

[12] This compares with 71 R&D professionals per 10,000 in the employed civilian labor force in 1985

# s/e personnel

## employment trends

Rapid growth in science and engineering employment during the past decade is an indicator of the increasingly important role played by science and technology in the U.S. economy. Despite the two economic recessions in the early eighties, the number of employed scientists and engineers increased at an average annual rate of 7.1 percent between 1976 and 1986, reaching 4.6 million—or nearly 4.2 percent—of the employed civilian workforce. In 1976, employed scientists and engineers represented 2.6 percent of the workforce.[13] Employment of scientists and engineers increased more than three times as fast as annual growth in the total U.S. workforce, and about twice the yearly rate of increase in total professional employment. Of the 4.6 million scientists and engineers, 15 percent (700,000) reported that they held jobs outside of science and engineering in 1986. Scientists were more likely than engineers to be employed in non-S/E activities.

All major sectors of the economy—industry, academia, and government—reported increases in S/E employment during the past decade.[14] Industry was the primary source of the growth in demand for scientists and engineers: this sector provided 1.7 million new jobs between 1976 and 1986, for an average annual 8.0-percent rate of increase. Two factors underlie industry's importance in contributing to S/E employment. First, scientists and engineers are concentrated in those industries, generally high-technology ones, which have exhibited relatively strong performance; and second, changes in occupational staffing have led to greater concentrations of S/E personnel within industrial workforces.[15] Such changes resulted from several interrelated factors, including: (1) efforts to enhance competitive positions through improvements in productivity, quality control, and cost containment; (2) increases in R&D activities; and (3) technological change, especially with respect to the diffusion of computer technology.

Academic S/E employment growth kept pace with that of industry, averaging 8.1 percent annually between 1976 and 1986, and adding about 340,000 jobs. This employment growth mirrored increases in academic R&D expenditures.

S/E employment in all levels of government has lagged behind that in other sectors, increasing at a 10-year average annual rate of 5.2 percent. S/E employment in the Federal Government alone grew at an annual rate of 4.9 percent between 1976 and 1986.

Of the 4.6 million scientists and engineers employed in 1986, nearly 2.2 million were scientists and 2.4 million were engineers. Growth in S/E employment varied considerably between these aggregate fields: during the 1976–86 period, reported employment of scientists grew significantly faster than that of engineers (8.6 percent versus 5.9 percent annually). Over the same period, however, the difference between rates of growth for scientists and engineers employed only in S/E jobs was somewhat narrower; 7.1 percent for employed scientists and 5.8 percent for employed engineers.

In 1986, women accounted for 15 percent of all employed scientists and engineers—27 percent of all scientists and 4 percent of all engineers. By comparison, women represented about 44 percent of the overall U.S. workforce and 43 percent of all professional employment.[16] Between 1976 and 1986, the employment of women scientists and engineers grew at more than twice the annual rate of men, 13.3 percent versus 6.3 percent. There is some evidence, however, that the rate of female S/E employment growth has been slowing in recent years.

Racial and ethnic minority groups vary with respect to their representation within the S/E workforce. Blacks and Hispanics[17] are underrepresented in S/E fields, accounting for about 2 percent each of S/E employment in 1986. These compare with professional employment shares of 6 percent for blacks and 5 percent for Hispanics. On the other hand, Asians' 5 percent S/E employment share is more than twice their 2 percent share of the professional workforce.[18]

[13]For detailed 1986 data on scientists and engineers, see National Science Foundation, *U S. Scientists and Engineers. 1986* (Detailed Statistical Tables)(NSF 87-322)(Washington, D C , 1988)

[14]Unless otherwise indicated, S/E employment refers to all employed scientists and engineers regardless of whether they are working in S/E jobs. Of the reported 4.6 million employed scientists and engineers in 1986, 3 9 million were engaged in S/E activities.

[15]National Science Foundation, *Changing Employment Patterns of Scientists, Engineers, and Technicians in Manufacturing Industries. 1977-80* (NSF 82-331)(Washington, D.C , 1983).

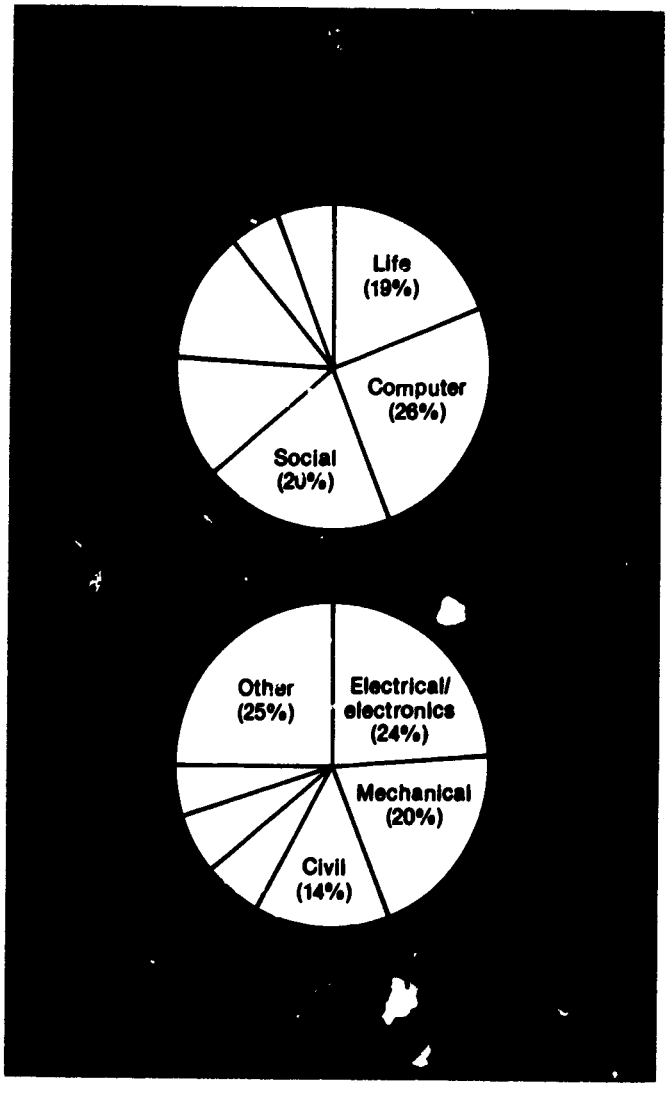
[16]*Economic Report of the President* (Washington, D C Supt ot Documents, U S. Government Printing Office, January 1987)

[17]Hispanics include Mexican-Americans, Puerto Ricans, Central Americans, etc

[18]For a full discussion of the role of women and minorities in the S/E workforce, including recent trends, see National Science Foundation, *Women and Minorities in Science and Engineering* (NSF 88-301)(Washington, D C., 1988)

Variations in employment growth rates among S/E fields have changed the distribution of the S/E workforce.[19] Computer specialties (including computer science, programming, systems analysis, and other specialties) remains the fastest growing S/E field as computer-related technology continues to be rapidly integrated throughout the U.S. economy. Such employment increased at an annual rate of 16.8 percent between 1976 and 1986 and has surpassed the life sciences—which grew at a 6.8-percent rate of increase—as the largest scientific field. In 1986, computer specialists represented one-quarter of science employment (chart 16). Employment growth during the past decade was far more uniform across engineering fields, varying between 6 percent and 7 percent for each of the major fields (chart 4). In 1986, electrical/electronics and mechanical engineering dominated other fields, representing one-quarter and one-fifth of the engineering workforce, respectively.

[19]These data again refer to changes in the field distribution of total scientists and engineers, regardless of whether they were employed in S/E jobs.



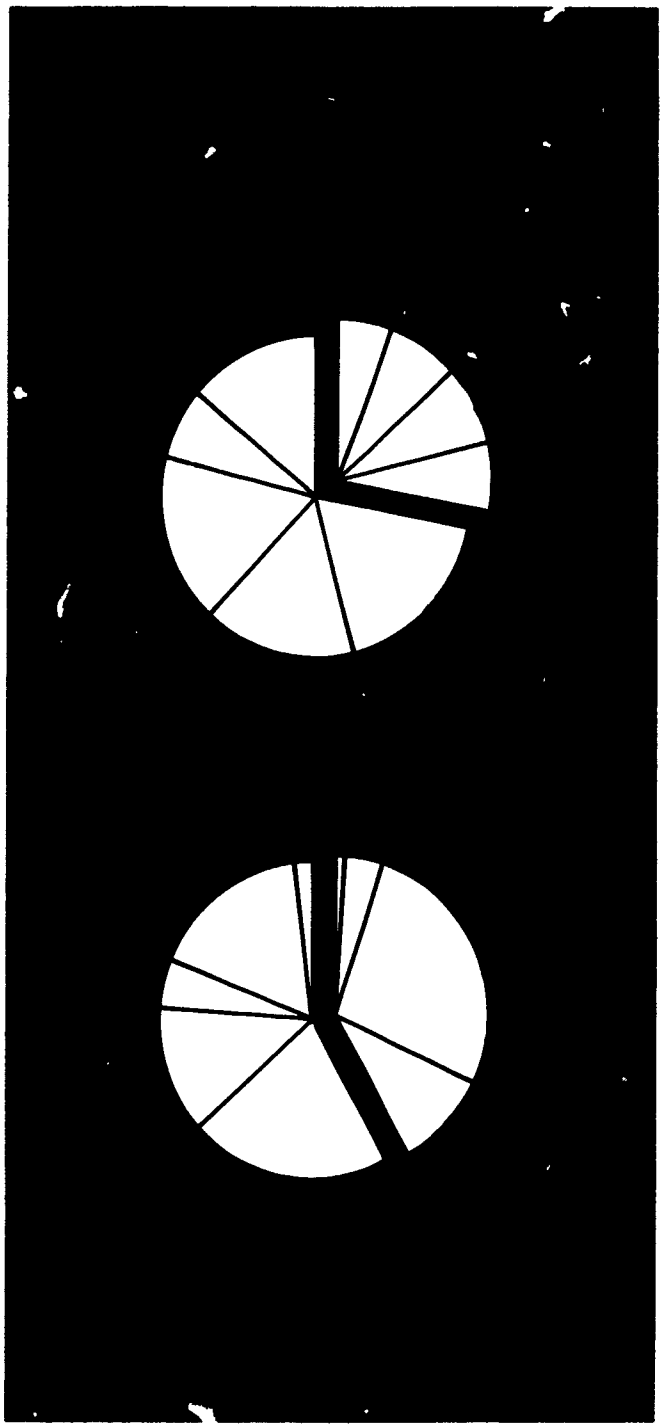

Work activities of scientists and engineers—measured by the level and distribution of those engaged in research and development, teaching, production, and other activities—describe the functions of U.S. scientists and engineers, as well as the skill requirements across employment sectors. Research and development continues to be the principal activity of U.S. scientists and engineers, primarily involving 36 percent of all scientists and engineers employed in 1986. However, growth in the number of S/E personnel reporting research and development as their primary work activity somewhat lagged growth of total S/E personnel between 1976 and 1986 (6.7-percent versus 7.1-percent annual growth).

Disaggregation by character of R&D activity shows increasing involvement of S/E personnel in development (7.2-percent annual growth), offset somewhat by slower rates of increase in the number of people engaged in R&D management and in research (6.1 percent each). In contrast, the proportion of the S/E workforce primarily engaged in production was among the fastest growing activities during the past 10 years. The relatively rapid 8.7-percent annual increase in S/E personnel reporting production as their primary work activity stemmed directly from industry's growing significance in the provision of S/E opportunities.

Differences in primary work activities by S/E field closely parallel concentration within various employment sectors. For example, as a percentage of their respective totals, engineers are more likely than scientists to be engaged in some aspect of development activities (28 percent versus 8 percent). Conversely, scientists tend to be more involved in basic and applied research functions than are engineers (13 percent versus 4 percent). Among remaining work activities, engineers are—because of their ties to industry—most closely linked to production (17 percent) and management (30 percent) activities. Scientists, on the other hand, reported spending more time teaching and preparing reports or data analyses (chart 17).

# s/e labor market balance

The S/E population historically has maintained a high rate of labor force participation; this indicates high levels of utilization and a small reserve that can be tapped during times of shortage. In 1986, the labor force participation rate of scientists and engineers was 95 percent. There was virtually no difference in the individual participation rates of scientists and engineers. While strong labor force attachment is characteristic of highly trained individuals, this rate was significantly above the 82 per-



cent reported for all persons with 4 or more years of college.

The unemployment rate measures the proportion of the labor force that is not employed but is seeking work. Trends and patterns in these rates for scientists and engineers suggest an increasing need for individuals with S/E training and shifts in the composition of the S/E workforce toward those fields of greatest demand. Overall, between 1976 and 1986, the unemployment rate for scientists and engineers decreased from 3.4 percent to 1.5 percent. A decline in the unemployment rate was noted for all reported individual S/E fields, with the exception of environmental scientists and chemical engineers. By comparison, the unemployment rate for the total professional labor force in 1986 was 2.4 percent.

Labor market conditions differ significantly among S/E fields, indicating varying potential for personnel shortages. In 1986, computer specialists reported an unemployment rate of 0.8 percent; physical scientists reported 1.4 percent; and all engineers, 1.2 percent. In particular, aeronautical/astronautical and nuclear engineers reported unemployment rates of 1 percent or less; electrical/electronics engineers reported a 1.1-percent rate. By contrast, among science fields, environmental scientists reported a relatively high unemployment rate of 3.5 percent. Within engineering fields, relatively high unemployment rates were reported for chemical (2.6 percent), petroleum (3.4 percent), and mining (2.2 percent) engineers.

The S/E employment rate measures the extent to which employed scientists and engineers have a job in science or engineering. A low rate suggests skill underutilization and a potential S/E labor reserve, while a high rate could signal a potential for shortages. Of the estimated 4.6 million scientists and engineers employed in 1986, 3.9 million (85 percent) were engaged in S/E activities. Between 1976 and 1986, the S/E employment rate dropped from 91 percent to 85 percent. Rates for engineers were well above those for scientists—92 percent and 77 percent, respectively—in 1986.

Within science fields, S/E employment rates ranged from 61 percent in the social sciences to 92 percent in the physical sciences. Among engineering fields, nuclear engineers had the highest S/E employment rate (98 percent); industrial engineers had the lowest (82 percent).

In general, the employment indicators discussed above suggest that the labor market for scientists and engineers has been in rough equilibrium. It can be inferred, for example, from the relatively high S/E participation rates and low S/E unemployment rates that in 1986 there was generally sufficient demand to accommodate the S/E labor force. Correspondingly, relatively few industrial employers reported shortages of S/E personnel in 1986. According to survey respondents, the only fields with as many as 15 percent of their employers reporting shortages were computer and biochemical engineering; the only other fields with shortages reported by more than 5 percent of their employers were electronic, electrical, industrial, and aeronautical/astronautical engineering and computer systems analysis.[20]

This relative balance in the industrial S/E employment situation contrasts with reports of persistent shortages of engineering school faculty. In 1986, for example, almost 9 percent of authorized full-time engineering faculty positions were unfilled; further, many institutions

[20]National Science Foundation/SRS unpublished data

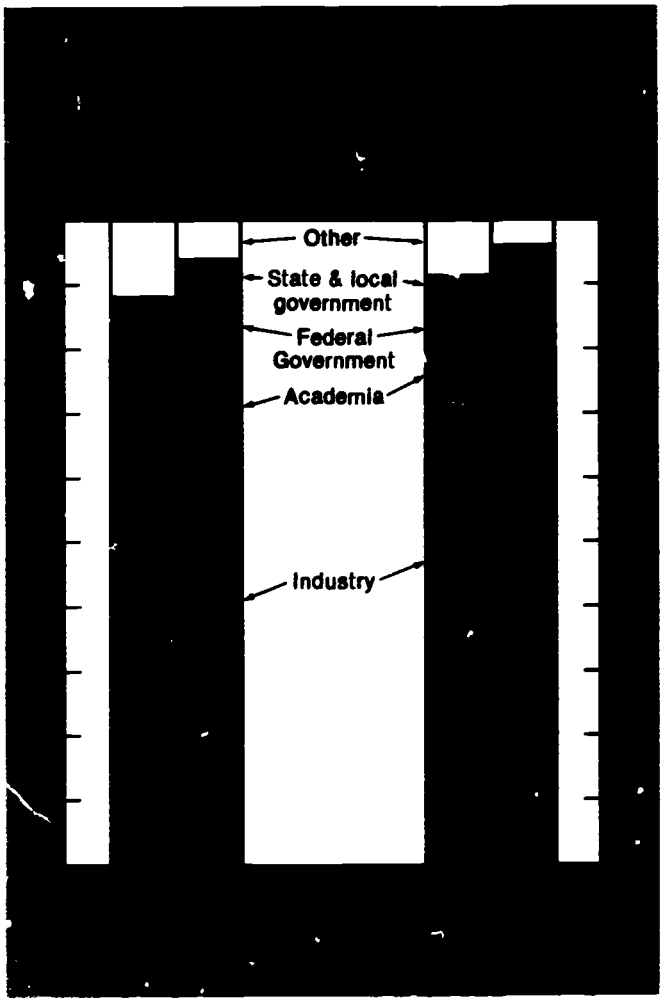
reported that the authorized levels would be higher if it were possible to fill such positions.[21] Probable causes of engineering faculty shortages are (1) the long-term decline in engineering doctorates awarded to U.S. citizens, and (2) the sector's problems in competing with industry in providing higher salaries and opportunities to work with state-of-the-art technology.

Projecting forward, high-technology industrial growth and the increasing use of high-technology goods and services in the economy as a whole should lead to greater demand for scientists and engineers in industry. The Bureau of Labor Statistics estimates that demand for S/E personnel—including technicians—will increase by 36 percent between 1986 and 2000, compared with a 20-percent increase for all occupations.[22] Among science occupations, the highest anticipated growth is expected for computer specialists (77 percent), and the lowest for physical scientists (13 percent). In engineering, the highest job growth is expected in electrical and electronics occupations (48 percent); the lowest anticipated growth is for nuclear engineers (less than 1 percent).

# sectoral patterns and trends

Since the midseventies, the sectoral distribution of scientists and engineers (including both those employed in S/E and non-S/E jobs) has changed slightly. Between 1976 and 1986, there was a 5-percentage point increase in the proportion employed by industry and a 1-point increase in State and local governments' share. There were corresponding 1- to 2-percentage-point reductions in the shares employed by educational institutions and the Federal Government. While sectoral changes are apparent at all S/E-degree levels, they have been most pronounced at the doctoral level. Here, employment opportunities have shifted significantly from academia to industry since the early seventies.

Industry is the largest employer of both scientists and engineers (chart 18). In 1986, 56 percent of all scientists (1.2 million) and 80 percent of all engineers (1.9 million) worked in this sector. The importance of industry in providing S/E job opportunities varies considerably by field. For example, industry employed 78 percent of computer specialists, roughly 60 percent of both physical and environmental scientists, one-half of social scientists, and about 40 percent of both mathematical and life




scientists. Among engineering fields, the proportion employed in industry ranged from 91 percent of petroleum engineers to 62 percent each of civil and nuclear engineers.

Between 1976 and 1986, annual growth in the employment of scientists in industry outpaced that of engineers, 10.0 percent versus 6.6 percent. Scientific employment growth was driven almost entirely by the rapid application of computer technology throughout industry which has generated a strong demand for personnel with computer-based skills. For engineers, employment growth was driven by the relatively strong demand for civil, electrical/electronics, and aeronautical/astronautical engineers.

Although the United States is moving from a production- to a service-oriented economy, a large fraction of industry's demand for S/E personnel remains concentrated in the manufacturing sector. For example, although manufacturing industries employed less than one-quarter of the total industrial workforce in 1986, they provided jobs for 60 percent of engineers and 30 percent of scientists employed by all industry. The importance

[21] National Science Foundation, *Young and Senior Science and Engineering Faculty and Nonfaculty Research Doctorates, 1986* (forthcoming)

[22] Bureau of Labor Statistics, Department of Labor, unpublished data. Growth projections are based on their "moderate trend" scenario

of the manufacturing sector in determining S/E employment rests on the fact that the majority of technology-intensive industries (as measured by the concentration of S/E personnel within their workforces) are found in this sector. These industries include chemicals and other allied products, electrical machinery, computers, transportation equipment, professional instruments, refined petroleum products, and nonelectrical machinery.

The Bureau of Labor Statistics reports that—in addition to scientists and engineers—industry employed almost 1.8 million S/E support technicians (including computer programmers and drafters) in 1986. This is up considerably from the 0.9 million technicians employed by industry in 1977. Mostly because of the relative importance of computer programmers and electrical/electronics engineering technicians to service-oriented activities, nonmanufacturing industries employed about three-fifths of all technicians in 1986; manufacturing industries employed about two-fifths.

Academia is the second largest employer of S/E personnel, employing about 24 percent of all scientists in the United States and 4 percent of all engineers in 1980. Academia employed 14 percent of the combined S/E total. The importance of educational institutions in providing S/E employment opportunities varies significantly by field. For example, in 1986, academia provided jobs to 45 percent of mathematical scientists, 36 percent of life scientists, 31 percent of psychologists, and 26 percent of social scientists. At the other extreme, these institutions employed only 7 percent of computer specialists.

In 1986, the Federal Government employed nearly 8 percent of all scientists and engineers, making it the third-largest S/E employer. State and local government employed another 5 percent of these personnel. Employment of engineers and scientists in all levels of government grew at annual rates of 5.1 percent and 5.4 percent, respectively, between 1976 and 1986. Personnel specialists have been concerned about government's ability to compete with other employment sectors in recruiting and retaining engineers, primarily because of noncompetitive salaries. In 1980, for example, there was no difference between the Federal Government and industry in starting salaries for baccalaureate engineers; by 1982, however, starting salaries for those in the Government had fallen to roughly 80 percent of those in industry.[23]

Federal employment is more technologically intensive than is employment of the overall workforce. In 1985, nearly 15 percent of Federal civilian white-collar workers were scientists or engineers, compared to only 6 percent of total white-collar employment in the United States. Computer specialists accounted for 17 percent of Federal Government S/E personnel. Fully 55 percent of the civilian white-collar workforce at NASA; 42 percent at the Environmental Protection Agency; and about 30 percent each at the Departments of Agriculture, Commerce, Energy, and the Interior were employed in S/E occupations. DOD was the largest Federal employer of S/E personnel in 1985 providing jobs to one-half of all S/E personnel employed by the Government.[24]

# doctoral scientists and engineers

Between 1975 and 1985, the employment of S/E doctorate-holders increased by 4.6 percent annually, reaching a level of 400,000.[25] While their unemployment rates have remained uniformly low across all fields, the proportion of S/E doctorate-holders employed in non-S/E jobs has been increasing, rising from 6 percent in 1975 to 9 percent in 1985.

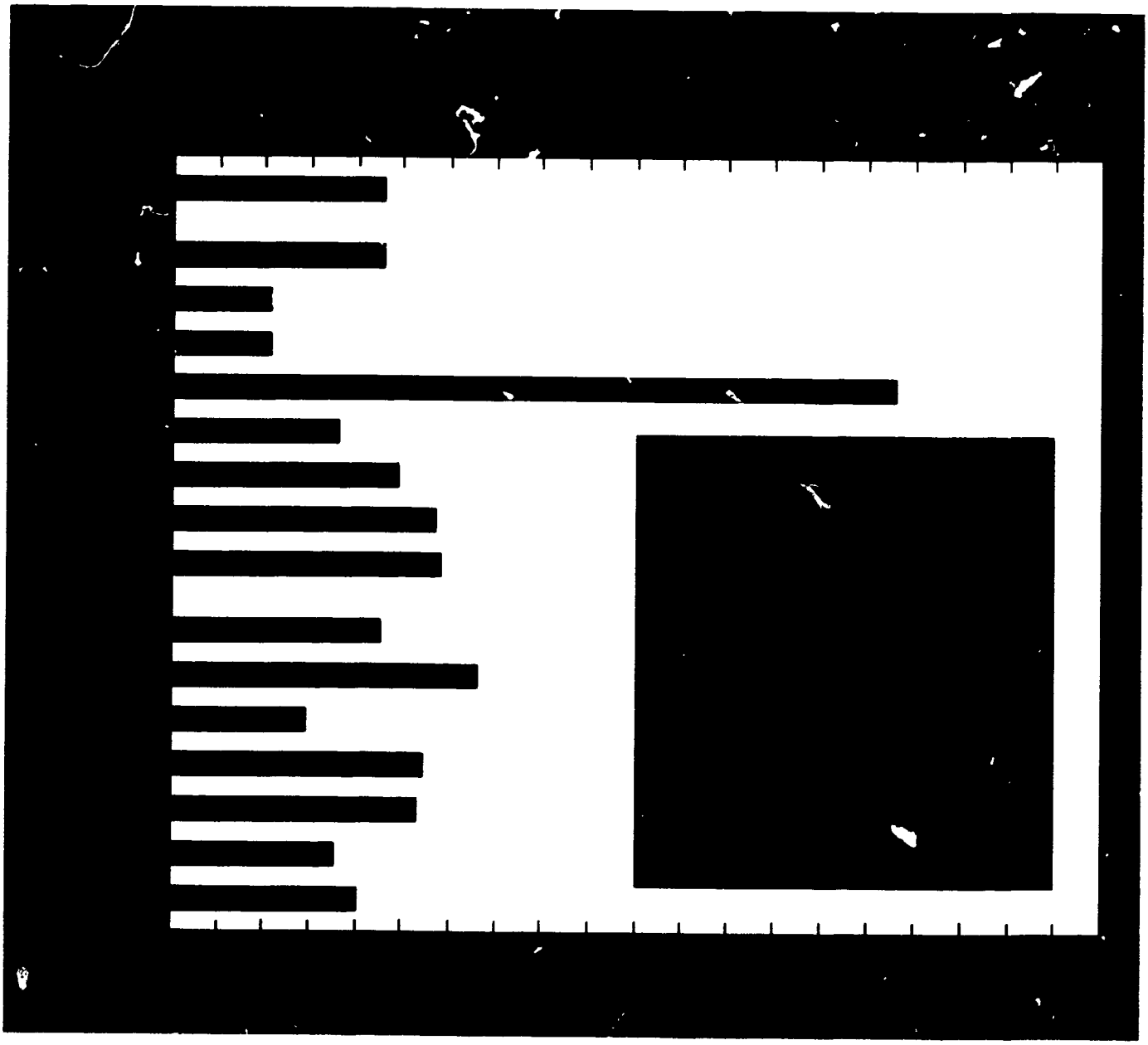
In 1985, doctoral scientists continued to outnumber doctoral engineers by about five to one, although—during the 1975–85 decade—employment growth of S/E doctorate-holders varied considerably by field. The lowest annual rates were recorded for physical and mathematical sciences, with 2.1-percent growth each per year. Computer specialties was the fastest growing science field, increasing by 15.6 percent annually (chart 19). Differential growth rates altered the field distributions of doctoral scientists and engineers during this period. Most notably, the proportions in the social sciences, psychology, and computer science increased; while the proportion in the physical sciences declined. Life sciences continue to account for the largest employment share (25 percent) of S/E doctorate-holders.

Between 1975 and 1985, there were also notable changes in the distribution of doctoral S/E employment by sector. For example, the employment of Ph.D. scientists and engineers in industry nearly doubled, increasing (on average) by 6.9 percent annually. As a result, the industrial share of total doctoral S/E employment increased from 25 percent in 1975 to 31 percent in 1985. This sectoral redistribution of the doctoral S/E workforce also was caused by a slow 3.6-percent academic employment growth rate. Academia accounted for 53 percent of the doctoral S/E workforce in 1985; this was down from its 1975 58-percent share.

[23]National Science Foundation, *Federal Scientific and Technical Workers Numbers and Characteristics, 1973 and 1983* (NSF 85-312)(Washington, D C , 1985)

[24]National Science Foundation, *Federal Scientists and Engineers. 1985* (Detailed Statistical Tables)(Washington, D C , 1986); and Office of Personnel Management, *Federal Civilian Workforce Statistics. Occupations of Federal White-Collar and Blue-Collar Workers* (Washington, D.C , October 31, 1985)

[25]National Science Foundation, *Characteristics of Doctoral Scientists and Engineers in the United States 1985* (Detailed Statistical Tables)(Washington, D.C., 1986).



The sectoral employment shifts of doctoral scientists and engineers have significantly affected their work activity patterns. There was sluggish growth in the number of doctorate-holders reporting teaching or management as their primary activity during the 1975–85 period. As a share of all work activities, teaching fell from 36 percent in 1975 to 28 percent in 1985. This decline was directly related to both the shift to nonacademic employment and the growing relative importance of basic and applied research in universities. Management activities as a share of the total declined from 20 percent to 17 percent over the same period.

The declining proportion of S/E doctorate-holders engaged in teaching and management was offset by gains in sales, production, and other related activities. Between 1975 and 1985, these latter activities increased sharply, accounting for 18 percent of all 1985 activities (up from 10 percent in 1975).

Throughout this 10-year period, approximately one-third of those holding S/E doctorates were employed in research and development. Over the last couple of years, however, the rate of increase in the number of S/E doctorate-holders engaged in research and development has slowed somewhat in industry, but has accelerated for doctorate-holders employed in educational institutions. For industry, the slowing largely reflects shifts in employment away from R&D-intensive fields. The more rapid increases in academic R&D employment mirror the

growth in academic R&D expenditures; these increased (in constant dollars) by 6.6 percent annually between 1983 and 1985, compared to 3-percent real academic R&D expenditure growth during the 1975–83 period.

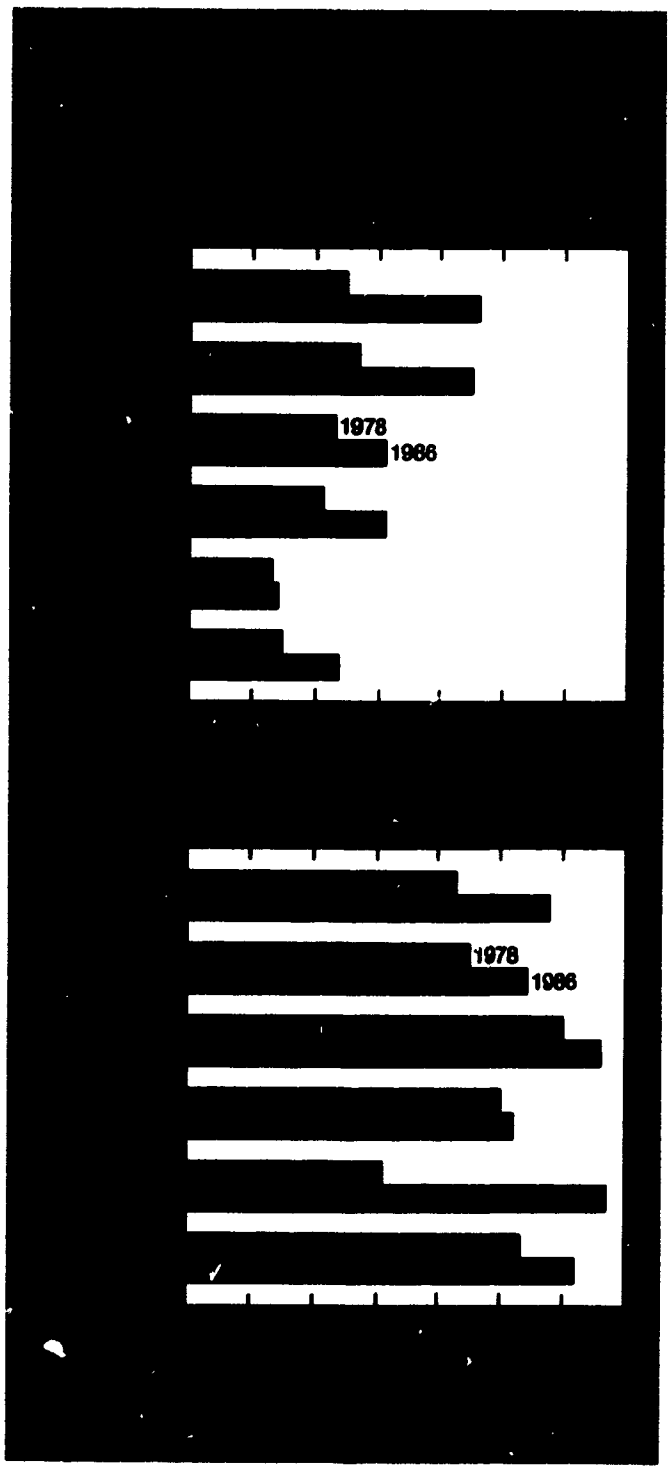
# foreign citizen participation

Attention recently has been focused on the ratio of foreign to U.S. citizen involvement in S/E activities in the United States. The broad issues are (1) the effect of increased foreign participation on the health of U.S. institutions of higher education, and (2) the potential impact of foreign S/E personnel on the domestic labor market.

Over the past 30 years, the number of foreign enrollments in U.S. universities and colleges has increased tenfold. In the 1985/86 academic year, approximately 344,000 students—slightly less than 3 percent of the total U.S. enrollment—were foreign. The majority of these students were from developing countries in South and East Asia, led by Taiwan, Malaysia, Korea, India, Iran, and China. Nearly one half of all foreigners were enrolled in S/E fields; this share has remained relatively constant for 20 years. Of the foreign S/E students, the majority studying engineering were enrolled at the undergraduate level, while the majority in most science fields were at the graduate level.[26]

Despite their rapid enrollment growth during the past three decades, foreign undergraduate students nonetheless receive less than 5 percent of science and 8 percent of engineering baccalaureates annually awarded in the United States. However, as a percent of graduate program enrollment and of advanced S/E degrees awarded, foreign students account for much higher shares than in the past. In 1986, foreign full-time graduate enrollment in S/E doctorate-granting institutions accounted for more than 28 percent of total full-time S/E student enrollment. This was up considerably from the 16-percent share reported in 1976. It also represented a 10-percent increase in foreign S/E graduate students over fall 1985. By contrast, the number of U.S. citizens enrolled rose by 2 percent from the previous year. Foreign graduate students comprised 40 percent or more of the student body in computer and mathematical sciences and most fields of engineering.

Foreign students also have been receiving an increasing share of S/E doctorate degrees awarded from U.S. universities. Between 1960 and 1980, foreign students consistently accounted for 14 percent to 19 percent of all doctorates awarded in the sciences. Since then, their percentage share has been increasing. Foreign students accounted for about one-fourth of Ph.D.'s in engineering throughout the sixties; this proportion has been rising steadily for the past 15 years. In 1986, foreign students received 55 percent of all doctorate degrees in engineering and 23 percent in the sciences (chart 20). Foreign doctorate-degree recipients were fairly evenly represented across all major engineering fields of study.




[26] National Science Foundation, *Foreign Citizens in U S Science and Engineering: History, Status, and Outlook* (NSF 86–305 revised)(Washington, D C , 1987)

Doctorate production is the major source of faculty supply. The high proportion of new engineering doctorates received by foreigners on temporary visas—coupled with the slow overall growth in U.S. citizens receiving such doctorates—has caused concern regarding the adequacy of future supply of engineering faculty. In 1986, about one-fifth (955) of total foreign recipients of S/E doctorates were studying on permanent visas; the remaining four-fifths (4,043) were on temporary visas. About one-half of those foreign students on temporary visas who had firm postgraduate plans at the time of graduation intended to remain in the United States. Of this group (1,370 responses), 54 percent planned to pursue postdoctoral study; a significant number planned to accept employment in academia (27 percent) and industry (17 percent). Of foreign students on permanent visas, about 78 percent who had firm postgraduation plans intended to locate in the United States (442 out of 562 respondents with firm plans).

In 1982—the latest year of available data—foreign-born, naturalized U.S. scientists and engineers made up 13 percent of the S/E workforce. Their concentration within occupations varied, ranging from 18 percent in civil engineering to 11 percent in the social and life sciences. Foreign nationals accounted for 4 percent of the total S/E workforce. Their concentration by field also varied, ranging from 5 percent in mathematical science to 1 percent in psychology. Many of these individuals eventually obtain U.S. citizenship.[27]

# s/e pipeline

The S/E pipeline provides important information on the quality and quantity of the future supply of new scientists and engineers. The process begins with the precollege experience of S/E students. High school mathematics and science courses and performance on standardized tests measuring quantitative ability become important determinants for entering S/E degree programs. Thereafter, future supply depends on degree production in S/E fields and on decisions to pursue S/E occupations.

# precollege science and mathematics

The decision to pursue an undergraduate S/E program and, subsequently, an S/E career is influenced significantly by exposure to precollege science and mathematics courses providing the basic principles needed to complete S/E undergraduate programs. For example, of high school sophomores in 1980 who graduated in 1982, more than two-thirds had taken three or more mathematics courses; fewer than one-half had taken more than two science courses.[28]

Curriculum placement is a significant factor in determining the extent and type of science and mathematics courses taken. Students following an academic track (versus general or career) tend to elect more advanced mathematics courses in geometry and calculus; they also are more likely than other students to take biology, chemistry, and physics. Between 1981 and 1985, the share of college-bound seniors choosing academic track programs increased 2 percentage points to 78.5 percent.[29]

The Scholastic Aptitude Test (SAT) attempts to measure precollege skill attainment and is widely used by colleges in admissions decisions. The SAT contains verbal and mathematics aptitude tests and offers achievement tests in a variety of subjects. Students who intend to major in science or engineering generally score much higher on both SAT math and verbal tests than do all students taking these tests. Between 1977 and 1986, mean SAT scores for students intending S/E majors remained relatively level: quantitative scores varied between 507 and 517, and verbal scores varied between 444 and 454. However, both verbal and math SAT scores for college-bound seniors intending to major in computer science fell considerably during the 1977–86 period; these scores were down 26 and 40 points, respectively.

# s/e degree production

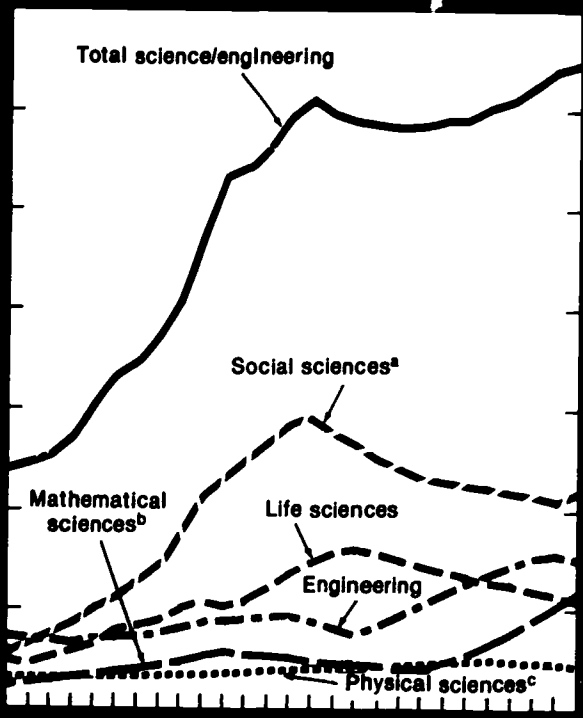
Annual production of S/E baccalaureates awarded in the United States had remained essentially level during the seventies (around 290,000 degrees); during the eighties, it is averaging about 2-percent annual growth. There were about 324,000 S/E bachelor's degrees awarded in 1986. Since 1980, the field distribution of S/E baccalaureates has changed significantly, favoring production of engineering and math science, including computer science degrees; degree production in the social and life sciences show the greatest decline (chart 21).

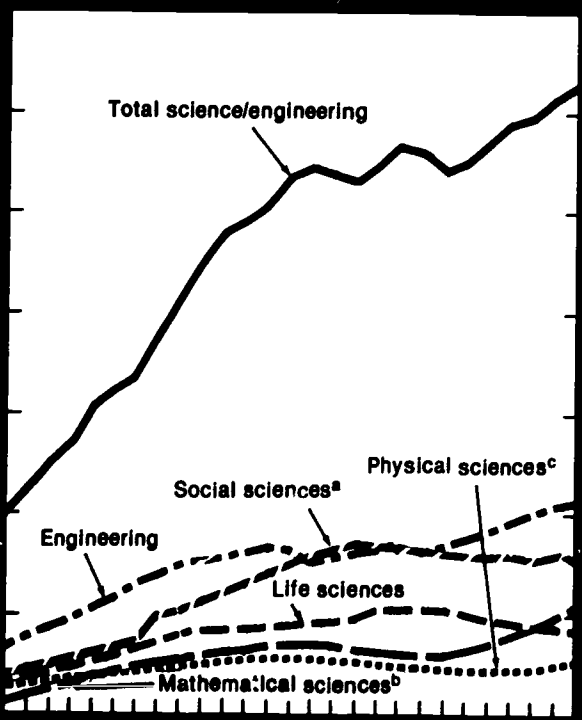
The number of S/E master's degrees increased steadily through the midseventies, declined somewhat in the late seventies, then rose sharply in 1982. By 1986, an all-time

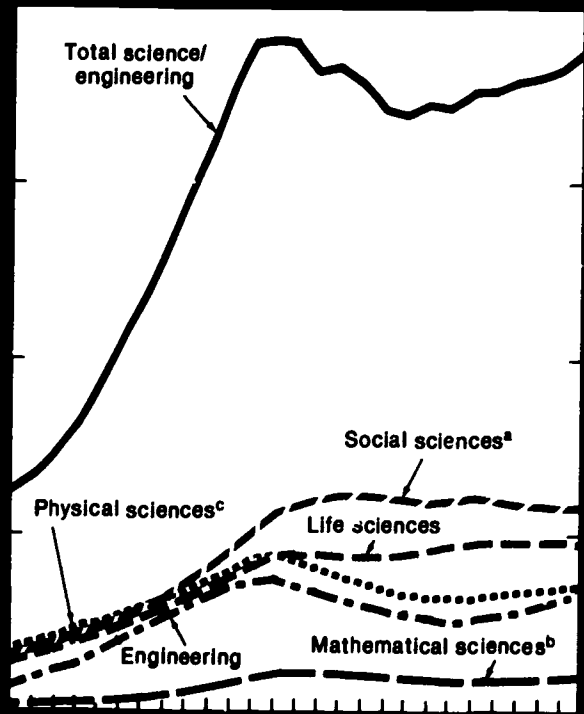
[27]Michael Finn, *Foreign National Scientists and Engineers in the U S Labor Force, 1972–82* (Oak Ridge, Tenn.: Oak Ridge Associated Universities, 1985). See also footnote 26.

[28]National Science Foundation, *Women and Minorities in Science and Engineering* (NSF 86-301)(Washington, D C , January 1986)

[29]Admissions Testing Program at the College Board, *Profiles, College-Bound Seniors, 1981–1985*, annual series (New York: College Entrance Examination Board)


Total science/engineering
Social sciences[a]
Mathematical sciences[b]
Life sciences
Engineering
Physical sciences[c]


Total science/engineering
Physical sciences[c]
Social sciences[a]
Engineering
Life sciences
Mathematical sciences[b]


Total science/
engineering
Social sciences[a]
Physical sciences[c]
Life sciences
Engineering
Mathematical sciences[b]

high of more than 62,500 students graduated with master's degrees in S/E fields.

The number of S/E doctorates awarded peaked at 19,000 in 1972; it then declined steadily, leveling out at a little more than 17,000 in 1978. Since then, however, the number of S/E doctorate degrees has increased almost annually (chart 21). In 1986, roughly 18,000 S/E doctorates—59 percent of all doctorate degrees—were awarded. All of this growth is accounted for by rapid increases in the number of foreign graduate students receiving such degrees; the number of U.S. citizens receiving S/E doctorates has declined somewhat since 1978. Engineering (3,376 degrees in 1986) and the physical sciences (3,679) have contributed most significantly to the growth in S/E doctorates since 1982. The 7-percent increase in engineering doctorates reported for 1986 represented this field's sixth consecutive year of growth. Doctorates in the life sciences (4,790) declined somewhat, while the social sciences (5,818) and computer science (1,129) registered gains of 2 percent and 13 percent, respectively.

# entry to the s/e labor market

Degree recipients are the major source of new supply to the S/E labor market. In measuring their contribution, however, it is important to take account not only of the number of new degrees granted, but also of the proportion of degree-holders who enter the labor market and ultimately find employment in S/E occupations. Leakages from the S/E supply are caused by numerous factors, including graduate school attendance, employment in non-S/E jobs, emigration of foreign student S/E graduates, and non-labor force participation.

In 1986, relatively few recent S/E graduates were unable to find employment. The unemployment rates for combined 1984–85 S/E graduates were uniformly low, ranging from an S/E low of 1.2 percent for recipients of engineering master's degrees to an S/E high of 3.9 percent for graduates with a bachelor's degree in science. Unemployment rates for master's-level science graduates and bachelor's-level engineering graduates were 2.6 percent and 2.4 percent, respectively.

The S/E employment rate (the proportion of employed S/E graduates in S/E jobs) varied considerably across fields and by degree level. Bachelor recipients in science fields had a 53-percent S/E employment rate, while students with a bachelor's degree in engineering had an 89-percent rate. Comparable rates for those with a master's degree were 84 percent in the sciences and 95 percent in engineering. More detailed data on S/E employment rates by field show that fewer than one-third of bachelor's and one-half of master's degree-holders in the social sciences were working in S/E jobs in 1986. This contrasts with 90-percent S/E employment rates for both bachelor's- and master's-degree recipients in computer science.

Substantial field mobility can be identified at labor market entry, a characteristic resulting from supply/demand adjustments and S/E personnel flexibility. In 1986, for example, 30 percent of the recent bachelor's and master's graduates working as computer specialists had not received their degrees in computer science. Rather, graduates in mathematics and engineering, responding to the job opportunities in computer specialties, accounted for the majority of influx from other S/E fields.

In 1986, roughly 20 percent of recent recipients of S/E bachelor's degrees were enrolled in full-time graduate programs; an additional 11 percent were enrolled on a part-time basis. Corresponding rates among master's degree-recipients were 21 percent and 9 percent, respectively. Graduate enrollment seems inversely related to employment demand. For example, relatively low graduate enrollment rates were observed in high-demand fields (e.g., the mathematic sciences, computer science, and engineering), compared to higher rates observed in such fields as the physical, life, and social sciences which show lower employment demand.

# appendixes

a. technical notes
b. detailed statistical tables

# appendix a

# technical notes

## basis for sectoring

The National Science Foundation follows a 4-sector division in surveying R&D funds and personnel and maintaining time series data on expenditures and employment:

**Federal Government.** This sector consists of the agencies of the Federal Government.

**Industry.** This sector consists of both manufacturing and nonmanufacturing companies. Manufacturing companies are classified by major industry groupings. Nonmanufacturing companies include those in selected services industries and are treated as a unit. Performance of federally funded research and development centers (FFRDCs) administered by industrial firms are included in industry totals. Industry funding of industry research and development includes all funds (e.g., from State and local governments) other than those received from Federal sources.

**Universities and colleges.** This sector consists of all institutions of higher education, both public and private. Expenditures of FFRDCs administered by universities and colleges are reported separately from totals for this sector. University funding of university research and development includes (1) State and local government funds separately budgeted for research and development, and (2) restricted or general funds that the institutions themselves have been free to allocate for research. Funds from the Federal Government, industry, or other nonprofit institutions, which are supplied in the form of grants or contracts for research and development at a university, are credited to the appropriate source. For example, research contracts from industry are treated as university performance funded by industry as the source. Funds given to the institution by industry for general educational purposes and used by the school, at its discretion, for research, are treated as university performance financed with the university's own funds.

**Other nonprofit institutions.** This sector consists of institutions that fall into two general groups: (1) organizations that are primarily granting in nature, namely private philanthropic foundations and voluntary health agencies, and (2) public and private organizations that are involved in performing research and development, including FFRDCs administered by nonprofit organizations.

## definitions

Research and development in this report consists of basic and applied research in the sciences (including medical sciences) and in engineering and activities in development, all defined below.

In terms of fields, the Federal, university, and nonprofit sectors include the broad fields of life sciences, physical sciences, environmental sciences, mathematics and computer sciences, psychology, physical sciences, engineering, social sciences, and an all-inclusive other sciences category. Industry coverage is limited to (1) the physical sciences, including related engineering, and (2) the biological sciences, including medicine but excluding psychology: it specifically excludes research in the social sciences.

**Basic research.** Within the Federal, university, and nonprofit sectors, basic research is defined as research directed toward increases in knowledge or understanding of the subject under study without specific application toward processes or products in mind. The definition for the industry sector is modified to indicate that basic research projects represent "knowledge...which do not have specific commercial objectives, although they may be in fields of present or potential interest to the reporting company."

**Applied research.** Within the Federal, university, and nonprofit sectors, applied research is defined as research directed toward gaining "knowledge or understanding necessary for determining the means by which a recognized and specific need may be met." Here again, the applied research definition for the industry sector is modified to include ". . . research projects which represent investigations directed to discovery of new scientific knowledge and which have specific commercial objectives with respect to either products or processes."

**Development.** The NSF survey definition of development is ". . . the systematic use of the knowledge or understanding gained from research directed toward the production of useful materials, devices, systems or methods, including design and development of prototypes and processes."

## current operating costs

Funds used for research and development, reported in this study, refer to current operating costs. They consist of both direct and indirect costs, including depreciation, insofar as this information is available to respondents. Capital expenditures are excluded by definition in the industry and universities and colleges sector surveys. Under the accounting practices of some Federal agencies, obligations for capital items may be included.

## performer-reporting basis

In NSF surveys, respondents in all sectors indicate the amounts they spend on research and development in their own sector and the sources of these funds. All national totals are based on data as reported by performers because they are in the best position to: (1) indicate how much they spent in the actual conduct of research and development in a given year, (2) classify their work as basic, applied, etc., and (3) identify the sector of the economy in which their financing originated. The consistent use of performer reporting also reduces the possibility of double-counting.

Federal agency obligations are used to estimate intramural performance in agency laboratories and therefore are treated as the equivalent of expenditures. Such intramural activities cover costs associated with the planning and administration of intramural and extramural R&D programs by Federal personnel as well as actual intramural R&D performance.

In general, the Federal Government and industry have been surveyed every year; the university and college sector has been surveyed annually since 1972. It has not been possible to maintain the same survey frequency for other nonprofit institutions. The last complete survey was conducted in 1973. Since then, informal surveys of this sector have periodically been undertaken. Research and development performed by State and local governments is not included in the national totals.

Details on survey methods, coverage, concepts, definitions, and reliability of the estimates associated with R&D expenditure data are contained in the complete NSF sectoral reports on R&D funding.

## use of time-series data

Data presented in trend tables are assembled from the most recently completed survey cycles. Data for prior years are reviewed for consistency with current-year's responses and, when necessary, revised in consultation with survey respondents. Consequently, references to data for prior years should be restricted to this document.

## defense-space-civilian classification

Defense expenditures consist of all R&D spending by the Department of Defense (DOD) and defense-related atomic energy programs of the Department of Energy. Space R&D expenditures are those only of the National Aeronautics and Space Administration. The space activities of DOD are included as spending on defense. All industry-funded research and development is classified as civilian research and development, including expenditures by aerospace and electronic industries.

## estimating procedure for 1987

**Federal Government.** Data are based on (1) changes shown in *Federal Funds for Research and Development: Fiscal Years 1986, 1987, and 1988 (Federal Funds)*, and (2) "Special Analysis J" on R&D spending in *The Budget of the United States Government, Fiscal Year 1988*.

**Industry.** Estimates are based on (1) Federal obligations reported in *Federal Funds*, (2) mail responses to an

annual NSF inquiry to its Industrial Panel on Science and Technology, and (3) interviews with R&D officials in the major R&D-performing industries. Respondents included 15 of the top 20 R&D-performing companies in the United States.

**Universities and colleges.** Estimates are based on (1) Federal obligations reported in *Federal Funds*, (2) extrapolations of recent trends for each of the non-Federal sources, and (3) a series of interviews with university survey respondents in which they were asked to give some indications of future R&D spending levels.

**Other nonprofit institutions.** Estimates are based on (1) Federal obligations reported in *Federal Funds*, (2) extrapolations of recent trends in R&D performance and funding within the industry and university sectors, and (3) an informal review of R&D expenditure trends expected by institutions in the nonprofit sector.

# human resources

A variety of surveys and estimation techniques are used to gather information on the numbers and characteristics of persons engaged in science and engineering (S/E) activities in all sectors of the economy. In general, two concepts are used in reporting worker inputs for research and development: surveys directed at employers and surveys directed at individuals. The employer surveys focus on the amount of time—in terms of person-years—devoted to the performance and management of research and development. Surveys of the individual result in data which reflect the demographic, primary work activity, and economic characteristics of the respondents.

Details on survey methods, coverage, concepts, definitions, and reliability of the estimates associated with S/E personnel data are contained in the complete NSF reports on each aspect of the S/E labor force.

# appendix b

# detailed statistical tables

## Table B-1. Transfers of funds expended annually for performance of research and development by sector, distributed by source: selected years[1]

[Dollars in millions]

| Year | Total | Federal Government | Industry[2] | Universities and colleges | Associated FFRDCs[3] | Other nonprofit institutions[2,4] |
|---|---|---|---|---|---|---|
| | | Total funds used | Total funds used | Total funds used | Total funds used | Total funds used |
| 1953 | 5,124 | 1,010 | 3,630 | 255 | 121 | 108 |
| 1960 | 13,523 | 1,726 | 10,509 | 646 | 360 | 282 |
| 1965 | 20,044 | 3,093 | 14,185 | 1,474 | 629 | 663 |
| 1966 | 21,846 | 3,220 | 15,548 | 1,715 | 630 | 733 |
| 1967 | 23,146 | 3,396 | 16,385 | 1,921 | 673 | 771 |
| 1968 | 24,605 | 3,494 | 17,429 | 2,149 | 719 | 814 |
| 1969 | 25,631 | 3,503 | 18,308 | 2,225 | 725 | 870 |
| 1970 | 26,134 | 4,079 | 18,067 | 2,336 | 737 | 915 |
| 1971 | 26,676 | 4,228 | 18,320 | 2,500 | 716 | 912 |
| 1972 | 28,477 | 4,590 | 19,552 | 2,630 | 753 | 952 |
| 1973 | 30,716 | 4,762 | 21,249 | 2,884 | 817 | 1,006 |
| 1974 | 32,864 | 4,911 | 22,867 | 3,023 | 885 | 1,178 |
| 1975 | 35,213 | 5,354 | 24,187 | 3,409 | 987 | 1,276 |

## Table B-1. Transfers of funds expended annually for performance of research and development by sector, distributed by source: selected years[1]—Con.

[Dollars in millions]

| Year | Total | Federal Government | Industry[2] | Universities and colleges | Associated FFRDCs[3] | Other nonprofit institutions[2,4] |
|---|---|---|---|---|---|---|
| | | Total funds used | Total funds used | Total funds used | Total funds used | Total funds used |
| 1976 | 39,018 | 5,769 | 26,987 | 3,729 | 1,147 | 1,376 |
| 1977 | 42,783 | 6,012 | 29,825 | 4,067 | 1,384 | 1,495 |
| 1978 | 48,129 | 6,811 | 33,304 | 4,825 | 1,717 | 1,672 |
| 1979 | 54,933 | 7,417 | 38,226 | 5,361 | 1,935 | 1,994 |
| 1980 | 62,593 | 7,632 | 44,505 | 6,080 | 2,246 | 2,150 |
| 1981 | 71,840 | 8,425 | 51,810 | 3,819 | 2,486 | 2,300 |
| 1982 | 79,316 | 9,141 | 57,995 | 7,276 | 2,479 | 2,425 |
| 1983 | 87,204 | 10,582 | 63,403 | 7,907 | 2,737 | 2,675 |
| 1984 | 97,636 | 11,572 | 71,470 | 8,503 | 3,118 | 2,975 |
| 1985 | 107,436 | 12,945 | 78,208 | 9,504 | 3,529 | 3,250 |
| 1986 (est.) | 114,697 | 13,535 | 83,562 | 10,600 | 3,600 | 3,400 |
| 1987 (est.) | 123,050 | 15,450 | 89,200 | 11,150 | 3,800 | 3,450 |

[1]All data are based on reports by performers.

[2]Expenditures for federally funded research and development centers (FFRDCs) administered by both industry and by nonprofit institutions are included in the totals of the respective sectors

[3]FFRDCs administered by individual universities and colleges and by university consortia.

[4]Data since 1973 have been estimated based on a survey conducted in that year.

[5]Distribution by non-Federal sources has been estimated for all years

[6]Includes State and local government funds

SOURCE. National Science Foundation, SRS

## Table B-2. Transfers of funds expended annually for performance of basic research by sector, distributed by source: selected years[1]

[Dollars in millions]

| Year | Total | Federal Government | Industry[2] | Universities and colleges | Associated FFRDCs[3] | Other nonprofit institutions[2 4] |
|---|---|---|---|---|---|---|
| | | Total funds used | Total funds used | Total funds used | Total funds used | Total funds used |
| 1953 | 441 | 101 | 151 | 110 | 33 | 46 |
| 1960 | 1,197 | 160 | 376 | 433 | 97 | 131 |
| 1965 | 2,555 | 364 | 592 | 1,136 | 208 | 253 |
| 1966 | 2,814 | 385 | 624 | 1,303 | 227 | 275 |
| 1967 | 3,056 | 435 | 629 | 1,457 | 250 | 285 |
| 1968 | 3,296 | 432 | 642 | 1,649 | 276 | 297 |
| 1969 | 3,441 | 532 | 618 | 1,711 | 275 | 305 |
| 1970 | 3,549 | 577 | 602 | 1,798 | 269 | 305 |
| 1971 | 3,672 | 586 | 580 | 1,914 | 280 | 322 |
| 1972 | 3,829 | 625 | 593 | 2,022 | 244 | 345 |
| 1973 | 3,946 | 608 | 631 | 2,053 | 297 | 357 |
| 1974 | 4,239 | 696 | 699 | 2,154 | 285 | 405 |
| 1975 | 4,606 | 734 | 730 | 2,410 | 309 | 425 |

## Table B-2. Transfers of funds expended annually for performance of basic research by sector, distributed by source: selected years[1]—Con.

[Dollars in millions]

| Year | Total | Federal Government | Industry[2] | Universities and colleges | Associated FFRDCs[3] | Other nonprofit institutions[2,4] |
|---|---|---|---|---|---|---|
| | | Total funds used | Total funds used | Total funds used | Total funds used | Total funds used |
| 1976 | 4,977 | 786 | 819 | 2,549 | 359 | 464 |
| 1977 | 5,537 | 9 | 911 | 2,800 | 402 | 510 |
| 1978 | 6,392 | 1,029 | 1,035 | 3,176 | 567 | 585 |
| 1979 | 7,257 | 1,089 | 1,158 | 3,812 | 718 | 680 |
| 1980 | 8,079 | 1,182 | 1,325 | 4,026 | 786 | 760 |
| 1981 | 9,180 | 1,302 | 1,614 | 4,576 | 863 | 825 |
| 1982 | 9,937 | 1,465 | 1,880 | 4,867 | 870 | 865 |
| 1983 | 11,039 | 1,690 | 2,152 | 5,269 | 983 | 945 |
| 1984 | 12,036 | 1,861 | 2,475 | 5,638 | 1,052 | 1,010 |
| 1985 | 13,081 | 1,923 | 2,678 | 6,377 | 1,078 | 1,075 |
| 1986 (est.) | 14,163 | 2,019 | 2,794 | 7,100 | 1,150 | 1,100 |
| 1987 (est.) | 14,950 | 2,220 | 3,000 | 7,370 | 1,200 | 1,160 |

[1]All data are based on reports by performers.

[2]Expenditures for federally funded research and development centers (FFRDCs) administered by both industry and by nonprofit institutions are included in the totals of the respective sectors.

[3]FFRDCs administered by individual universities and colleges and by university consortia.

[4]Data since 1973 have been estimated based on a survey conducted in that year.

[5]Distribution by non-Federal sources has been estimated for all years.

[6]Includes State and local government funds.

SOURCE: National Science Foundation, SRS

## Table B-3. Transfers of funds expended annually for performance of applied research by sector, distributed by source: selected years[1]

[Dollars in millions]

| Year | Total | Federal Government | Industry[2] | Universities and colleges | Associated FFRDCs[3] | Other nonprofit institutions[4] |
|---|---|---|---|---|---|---|
| | | Total funds used | Total funds used | Total funds used | Total funds used | Total funds used |
| 1953 | 1,279 | 345 | 726 | 130 | 44 | 34 |
| 1960 | 3,020 | 595 | 2,029 | 179 | 122 | 95 |
| 1965 | 4,339 | 990 | 2,656 | 279 | 204 | 208 |
| 1966 | 4,601 | 997 | 2,843 | 328 | 207 | 226 |
| 1967 | 4,780 | 1,027 | 2,915 | 374 | 219 | 245 |
| 1968 | 5,131 | 1,110 | 3,124 | 404 | 231 | 262 |
| 1969 | 5,316 | 1,114 | 3,287 | 407 | 210 | 299 |
| 1970 | 5,720 | 1,327 | 3,427 | 427 | 216 | 323 |
| 1971 | 5,739 | 1,302 | 3,415 | 474 | 210 | 338 |
| 1972 | 5,964 | 1,360 | 3,514 | 524 | 221 | 365 |
| 1973 | 6,597 | 1,480 | 3,825 | 713 | 226 | 353 |
| 1974 | 7,228 | 1,574 | 4,288 | 736 | 217 | 413 |
| 1975 | 7,863 | 1,730 | 4,570 | 851 | 284 | 448 |

## Table B-3. Transfers of funds expended annually for performance of applied research by sector, distributed by source: selected years[1]

[Dollars in millions]

| Year | Total | Federal Government | Industry[2] | Universities and colleges | Associated FFRDCs[3] | Other nonprofit institutions[4] |
|---|---|---|---|---|---|---|
| | | Total funds used | Total funds used | Total funds used | Total funds used | Total funds used |
| 1976 | 9,046 | 2,093 | 5,112 | 1,016 | 327 | 498 |
| 1977 | 9,745 | 2,044 | 5,636 | 1,067 | 495 | 533 |
| 1978 | 10,844 | 2,192 | 6,300 | 1,213 | 549 | 590 |
| 1979 | 12,372 | 2,392 | 7,225 | 1,465 | 580 | 710 |
| 1980 | 14,050 | 2,484 | 8,450 | 1,691 | 700 | 725 |
| 1981 | 16,877 | 2,732 | 10,869 | 1,866 | 800 | 780 |
| 1982 | 18,518 | 2,729 | 12,175 | 2,004 | 795 | 815 |
| 1983 | 20,351 | 3,020 | 13,505 | 2,101 | 950 | 875 |
| 1984 | 22,186 | 2,903 | 15,028 | 2,390 | 950 | 915 |
| 1985 | 24,632 | 3,133 | 16,911 | 2,572 | 1,066 | 950 |
| 1986 (est.) | 24,752 | 3,141 | 16,711 | 2,900 | 1,050 | 950 |
| 1987 (est.) | 26,010 | 3,315 | 17,550 | 3,080 | 1,100 | 965 |

[redacted]

[1]All data are based on reports by performers.

[2]Expenditures for federally funded research and development centers (FFRDCs) administered by both industry and by nonprofit institutions are included in the totals of the respective sectors.

[3]FFRDCs administered by individual universities and colleges and by university consortia.

[4]Data since 1973 have been estimated based on a survey conducted in that year.

[5]Distribution by non-Federal sources ' s been estimated for all years.

[6]Includes State and local government funds

SOURCE: National Science Foundation, SRS

## Table B-4. Transfers of funds expended annually for performance of development by sector, distributed by source: selected years[1]

[Dollars in millions]

| Year | Total | Federal Government | Industry[2] | Universities and colleges | Associated FFRDCs[3] | Other nonprofit institutions[2,4] |
|---|---|---|---|---|---|---|
| | | Total funds used | Total funds used | Total funds used | Total funds used | Total funds used |
| 1953 | 3,404 | 564 | 2,753 | 15 | 44 | 28 |
| 1960 | 9,306 | 971 | 8,104 | 34 | 141 | 56 |
| 1965 | 13,150 | 1,739 | 10,935 | 57 | 217 | 202 |
| 1966 | 14,431 | 1,838 | 12,081 | 84 | 196 | 232 |
| 1967 | 15,310 | 1,934 | 12,841 | 97 | 204 | 241 |
| 1968 | 16,178 | 1,952 | 13,663 | 96 | 212 | 255 |
| 1969 | 16,874 | 1,857 | 14,403 | 107 | 240 | 267 |
| 1970 | 16,865 | 2,175 | 14,036 | 112 | 252 | 286 |
| 1971 | 17,265 | 2,340 | 14,315 | 112 | 246 | 252 |
| 1972 | 18,664 | 2,605 | 15,445 | 84 | 288 | 242 |
| 1973 | 20,175 | 2,674 | 16 793 | 118 | 294 | 296 |
| 1974 | 2*,397 | 2,841 | 17,900 | 133 | 363 | 360 |
| 1975 | 22,742 | 2,890 | 16,887 | 148 | 414 | 403 |

## Table B-4. Transfers of funds expended annually for performance of development by sector, distributed by source: selected years[1]

[Dollars in millions]

| Year | Total | Federal Government | Industry[2] | Universities and colleges | Associated FFRDCs[3] | Other nonprofit institutions[2,4] |
|---|---|---|---|---|---|---|
| | | Total funds used | Total funds used | Total funds used | Total funds used | Total funds used |
| 1976 | 24,995 | 2,890 | 21,086 | 164 | 461 | 414 |
| 1977 | 27,501 | 3,054 | 23,276 | 200 | 517 | 452 |
| 1978 | 30,893 | 3,590 | 25,969 | 236 | 601 | 497 |
| 1979 | 35,304 | 3,936 | 29,843 | 284 | 637 | 604 |
| 1980 | 40,464 | 3,966 | 34,730 | 343 | 760 | 665 |
| 1981 | 45,781 | 4,391 | 39,497 | 377 | 823 | 695 |
| 1982 | 50,861 | 4,947 | 43,940 | 415 | 814 | 745 |
| 1983 | 55,814 | 5,872 | 47,746 | 437 | 904 | 855 |
| 1984 | 63,416 | 6,808 | 53,967 | 475 | 1,118 | 1,050 |
| 1985 | 69,723 | 7,869 | 58,699 | 555 | 1,385 | 1,225 |
| 1986 (est.) | 75,782 | 8,375 | 64,051 | 600 | 1,400 | 1,350 |
| 1987 (est.) | 82,090 | 9,915 | 69,650 | 700 | 1,500 | 1,325 |

[1]All data are based on reports by performers.

[2]Expenditures for federally funded research and development centers (FFRDCs) administered by both industry and by nonprofit institutions are included in the totals of the respective sectors.

[3]FFRDCs administered by individual universities and colleges and by university consortia.

[4]Data since 1973 have been estimated based on a survey conducted in that year.

[5]Distribution by non-Federal sources has been estimated for all years.

[6]Includes State and local government funds

SOURCE. National Science Foundation, SRS

## Table B-5. Sources of funds for research and development by sector

[Dollars in millions]

Current dollars

| Year | Total | Federal Government | Industry | Universities and colleges | Other nonprofit institutions |
|---|---|---|---|---|---|
| 1953 | $ 5,124 | $ 2,753 | $ 2,245 | $ 72 | $ 54 |
| 1960 | 13,523 | 8,738 | 4,516 | 149 | 120 |
| 1965 | 20,044 | 13,012 | 6,548 | 267 | 217 |
| 1966 | 21,846 | 13,968 | 7,328 | 304 | 246 |
| 1967 | 23,146 | 14,395 | 8,142 | 345 | 264 |
| 1968 | 24,605 | 14,928 | 9,005 | 390 | 282 |
| 1969 | 25,631 | 14,895 | 10,010 | 420 | 306 |
| 1970 | 26,134 | 14,892 | 10,444 | 461 | 337 |
| 1971 | 26,676 | 14,964 | 10,822 | 529 | 361 |
| 1972 | 28,477 | 15,808 | 11,710 | 574 | 385 |
| 1973 | 30,716 | 16,399 | 13,293 | 613 | 413 |
| 1974 | 32,864 | 16,850 | 14,878 | 677 | 459 |
| 1975 | 35,213 | 18,109 | 15,820 | 749 | 535 |
| 1976 | 39,016 | 19,914 | 17,694 | 810 | 600 |
| 1977 | 42,783 | 21,594 | 19,629 | 888 | 672 |
| 1978 | 46,129 | 23,876 | 22,450 | 1,037 | 766 |
| 1979 | 54,933 | 26,615 | 26,082 | 1,198 | 838 |
| 1980 | 62,593 | 29,453 | 30,913 | 1,318 | 909 |
| 1981 | 71,840 | 33,405 | 35,944 | 1,520 | 971 |
| 1982 | 79,316 | 36,505 | 40,096 | 1,690 | 1,025 |
| 1983 | 87,204 | 40,671 | 43,515 | 1,881 | 1,137 |
| 1984 | 97,638 | 45,340 | 49,066 | 2,024 | 1,208 |
| 1985 | 107,436 | 51,276 | 52,597 | 2,259 | 1,304 |
| 1986 | 114,697 | 55,273 | 55,549 | 2,500 | 1,375 |
| 1987 | 123,050 | 60,350 | 58,570 | 2,700 | 1,430 |

Constant (1982) dollars[1]

| Year | Total | Federal Government | Industry | Universities and colleges | Other nonprofit institutions |
|---|---|---|---|---|---|
| 1953 | $ 19,744 | $10,590 | $ 6,871 | $ 276 | $ 206 |
| 1960 | 43,648 | 28,191 | 14,591 | 479 | 387 |
| 1965 | 59,351 | 38,532 | 19,384 | 791 | 643 |
| 1966 | 62,589 | 40,047 | 20,962 | 875 | 706 |
| 1967 | 64,406 | 40,057 | 22,654 | 960 | 735 |
| 1968 | 65,458 | 39,788 | 23,869 | 1,049 | 752 |
| 1969 | 64,672 | 37,660 | 25,166 | 1,071 | 775 |
| 1970 | 62,405 | 35,636 | 24,851 | 1,111 | 807 |
| 1971 | 60,385 | 33,966 | 24,387 | 1,212 | 820 |
| 1972 | 61,414 | 34,146 | 25,190 | 1,246 | 832 |
| 1973 | 62,427 | 33,476 | 26,837 | 1,268 | 844 |
| 1974 | 61,467 | 31,726 | 27,576 | 1,298 | 865 |
| 1975 | 59,883 | 30,966 | 26,879 | 1,302 | 916 |
| 1976 | 62,134 | 31,813 | 28,058 | 1,305 | 959 |
| 1977 | 63,653 | 32,152 | 29,178 | 1,325 | 1,001 |
| 1978 | 66,769 | 33,172 | 31,08 | 1,446 | 1,064 |
| 1979 | 70,077 | 34,271 | 33,19 | 1,538 | 1,071 |
| 1980 | 73,235 | 34,548 | 36,066 | 1,555 | 1,066 |
| 1981 | 76,610 | 35,685 | 38,257 | 1,631 | 1,037 |
| 1982 | 79,316 | 36,505 | 40,096 | 1,690 | 1,025 |
| 1983 | 83,891 | 39,097 | 41,896 | 1,805 | 1,093 |
| 1984 | 90,541 | 42,007 | 45,544 | 1,871 | 1,119 |
| 1985 | 96,532 | 46,030 | 47,310 | 2,023 | 1,170 |
| 1986 | 100,398 | 48,318 | 48,702 | 2,177 | 1,201 |
| 1987 | 104,345 | 51,154 | 49,893 | 2,286 | 1,212 |

[1]Based on GNP implicit price deflator

SOURCE: National Science Foundation, SRS

## Table B-6. Research and development performance by sector

[Dollars in millions]

Current dollars

| Year | Total | Federal Government | Industry | Universities and colleges | Associated FFRDCs | Other nonprofit institutions |
|---|---|---|---|---|---|---|
| 1953 | $ 5,124 | $ 1,010 | $ 3,630 | $ 255 | $ 121 | $ 108 |
| 1960 | 13,523 | 1,726 | 10,509 | 646 | 360 | 282 |
| 1965 | 20,044 | 3,093 | 14,185 | 1,474 | 629 | 663 |
| 1966 | 21,846 | 3,220 | 15,548 | 1,715 | 630 | 733 |
| 1967 | 23,146 | 3,396 | 16,385 | 1,921 | 673 | 771 |
| 1968 | 24,605 | 3,494 | 17,429 | 2,149 | 719 | 814 |
| 1969 | 25,631 | 3,503 | 18,308 | 2,225 | 725 | 870 |
| 1970 | 26,134 | 4,079 | 18,067 | 2,335 | 737 | 916 |
| 1971 | 26,676 | 4,228 | 18,320 | 2,500 | 716 | 912 |
| 1972 | 28,477 | 4,590 | 19,552 | 2,630 | 753 | 952 |
| 1973 | 30,716 | 4,762 | 21,249 | 2,884 | 817 | 1,006 |
| 1974 | 32,864 | 4,911 | 22,887 | 3,023 | 865 | 1,178 |
| 1975 | 35,213 | 5,354 | 24,187 | 3,409 | 987 | 1,276 |
| 1976 | 39,016 | 5,769 | 26,997 | 3,729 | 1,147 | 1,376 |
| 1977 | 42,783 | 6,012 | 29,825 | 4,067 | 1,384 | 1,495 |
| 1978 | 46,129 | 6,811 | 33,[illegible] | 4,625 | 1,717 | 1,672 |
| 1979 | 54,933 | 7,417 | 38,226 | 5,361 | 1,935 | 1,994 |
| 1980 | 62,593 | 7,632 | 44,505 | 6,060 | 2,246 | 2,150 |
| 1981 | 71,840 | 8,425 | 51,810 | 6,819 | 2,486 | 2,300 |
| 1982 | 79,316 | 9,141 | 57,995 | 7,276 | 2,479 | 2,425 |
| 1983 | 87,204 | 10,582 | 63,403 | 7,807 | 2,737 | 2,675 |
| 1984 | 97,638 | 11,572 | 71,470 | 8,503 | 3,118 | 2,975 |
| 1985 | 107,436 | 12,945 | 78,208 | 9,504 | 3,529 | 3,250 |
| 1986 | 114,697 | 13,535 | 83,562 | 10,600 | 3,600 | 3,400 |
| 1987 | 123,050 | 15,540 | 89,200 | 11,150 | 3,800 | 3,450 |

Constant (1982) dollars[1]

| Year | Total | Federal Government | Industry | Universities and colleges | Associated FFRDCs | Other nonprofit institutions |
|---|---|---|---|---|---|---|
| 1953 | $ 19,744 | $ 3,867 | $14,021 | $ 976 | $ 463 | $ 417 |
| 1960 | 43,648 | 5,548 | 33,955 | 2,077 | 1,157 | 911 |
| 1965 | 59,351 | 9,164 | 41,992 | 4,367 | 1,864 | 1,963 |
| 1966 | 62,589 | 9,269 | 44,474 | 4,937 | 1,813 | 2,097 |
| 1967 | 64,406 | 9,452 | 45,590 | 5,347 | 1,873 | 2,145 |
| 1968 | 65,458 | 9,395 | 46,194 | 5,776 | 1,933 | 2,157 |
| 1969 | 64,672 | 8,936 | 46,023 | 5,676 | 1,849 | 2,187 |
| 1970 | 62,405 | 9,834 | 42,966 | 5,629 | 1,777 | 2,179 |
| 1971 | 60,385 | 9,684 | 41,280 | 5,726 | 1,640 | 2,055 |
| 1972 | 61,414 | 9,965 | 42,056 | 5,710 | 1,635 | 2,048 |
| 1973 | 62,427 | 9,849 | 42,893 | 5,965 | 1,690 | 2,031 |
| 1974 | 61,467 | 9,415 | 42,415 | 5,796 | 1,658 | 2,183 |
| 1975 | 59,883 | 9,308 | 40,781 | 5,927 | 1,716 | 2,151 |
| 1976 | 62,134 | 9,293 | 42,805 | 6,007 | 1,848 | 2,182 |
| 1977 | 63,653 | 8,969 | 44,330 | 6,067 | 2,065 | 2,222 |
| 1978 | 66,769 | 9,497 | 46,115 | 6,449 | 2,394 | 2,315 |
| 1979 | 70,077 | 9,521 | 48,652 | 6,882 | 2,484 | 2,538 |
| 1980 | 73,235 | 9,006 | 51,919 | 7,151 | 2,650 | 2,508 |
| 1981 | 76,610 | 9,039 | 55,140 | 7,318 | 2,667 | 2,448 |
| 1982 | 79,316 | 9,141 | 57,995 | 7,276 | 2,479 | 2,425 |
| 1983 | 83,891 | 10,153 | 61,047 | 7,490 | 2,626 | 2,576 |
| 1984 | 90,541 | 10,696 | 66,342 | 7,859 | 2,882 | 2,762 |
| 1985 | 96,532 | 11,590 | 70,350 | 8,5[illegible] | 3,160 | 2,923 |
| 1986 | 100,398 | 11,785 | 73,268 | 9,22[illegible] | 3,135 | 2,981 |
| 1987 | 104,345 | 13,079 | 75,683 | 9,439 | 3,217 | 2,927 |

[1]Based on GNP implicit price deflator.

SOURCE: National Science Foundation, SRS

## Table B-7. Sources of funds for basic research by sector

[Dollars in millions]

Current dollars

| Year | Total | Federal Government | Industry | Universities and colleges | Other nonprofit institutions |
|---|---|---|---|---|---|
| 1953 | $ 441 | $ 251 | $ 153 | $ 10 | $ 27 |
| 1960 | 1,197 | 715 | 342 | 72 | 68 |
| 1965 | 2,555 | 1,809 | 461 | 164 | 121 |
| 1966 | 2,614 | 1,976 | 510 | 197 | 129 |
| 1967 | 3,056 | 2,201 | 492 | 223 | 140 |
| 1968 | 3,296 | 2,336 | 535 | 276 | 149 |
| 1969 | 3,441 | 2,441 | 540 | 298 | 162 |
| 1970 | 3,549 | 2,489 | 528 | 350 | 182 |
| 1971 | 3,672 | 2,529 | 547 | 400 | 196 |
| 1972 | 3,829 | 2,633 | 563 | 415 | 218 |
| 1973 | 3,946 | 2,709 | 605 | 406 | 224 |
| 1974 | 4,239 | 2,912 | 651 | 432 | 244 |
| 1975 | 4,608 | 3,139 | 705 | 478 | 286 |
| 1976 | 4,977 | 3,436 | 769 | 475 | 297 |
| 1977 | 5,537 | 3,823 | 850 | 527 | 337 |
| 1978 | 6,392 | 4,445 | 964 | 605 | 378 |
| 1979 | 7,257 | 5,044 | 1,092 | 709 | 412 |
| 1980 | 8,079 | 5,581 | 1,267 | 800 | 451 |
| 1981 | 9,180 | 6,211 | 1,588 | 906 | 475 |
| 1982 | 9,937 | 6,646 | 1,813 | 982 | 496 |
| 1983 | 11,039 | 7,271 | 2,045 | 1,144 | 579 |
| 1984 | 12,036 | 7,816 | 2,416 | 1,214 | 588 |
| 1985 | 13,801 | 8,427 | 2,647 | 1,382 | 645 |
| 1986 | 14,163 | 9,133 | 2,815 | 1,530 | 685 |
| 1987 | 14,950 | 9,670 | 2,970 | 1,600 | 710 |

Constant (1982) dollars[1]

| Year | Total | Federal Government | Industry | Universities and colleges | Other nonprofit institutions |
|---|---|---|---|---|---|
| 1953 | $ 1,695 | $ 962 | $ 591 | $ 38 | $104 |
| 1960 | 3,856 | 2,301 | 1,105 | 231 | 219 |
| 1965 | 7,568 | 5,353 | 1,365 | 486 | 358 |
| 1966 | 8,084 | 5,687 | 1,459 | 587 | 370 |
| 1967 | 8,505 | 6,125 | 1,369 | 621 | 390 |
| 1968 | 8,826 | 6,267 | 1,419 | 742 | 398 |
| 1969 | 8,744 | 6,214 | 1,359 | 760 | 411 |
| 1970 | 8,527 | 5,990 | 1,258 | 844 | 436 |
| 1971 | 8,377 | 5,780 | 1,234 | 916 | 446 |
| 1972 | 8,294 | 5,710 | 1,212 | 901 | 472 |
| 1973 | 8,112 | 5,586 | 1,224 | 844 | 459 |
| 1974 | 8,056 | 5,557 | 1,210 | 826 | 461 |
| 1975 | 7,951 | 5,436 | 1,192 | 831 | 491 |
| 1976 | 7,985 | 5,523 | 1,221 | 765 | 475 |
| 1977 | 8,253 | 5,701 | 1,264 | 786 | 502 |
| 1978 | 8,897 | 6,192 | 1,336 | 844 | 525 |
| 1979 | 9,296 | 6,468 | 1,391 | 910 | 527 |
| 1980 | 9,506 | 6,552 | 1,480 | 944 | 529 |
| 1981 | 9,828 | 6,657 | 1,692 | 972 | 508 |
| 1982 | 9,937 | 6,646 | 1,813 | 982 | 496 |
| 1983 | 10,602 | 6,960 | 1,968 | 1,098 | 556 |
| 1984 | 11,139 | 7,229 | 2,243 | 1,122 | 544 |
| 1985 | 11,727 | 7,550 | 2,380 | 1,219 | 578 |
| 1986 | 12,356 | 7,960 | 2,466 | 1,332 | 598 |
| 1987 | 12,664 | 8,188 | 2,519 | 1,354 | 602 |

[1]Based on GNP implicit price deflator

SOURCE: National Science Foundation, SRS

## Table B-8. Basic research performance by sector

[Dollars in millions]

Current Dollars

| Year | Total | Federal Government | Industry | Universities and colleges | Associated FFRDCs | Other nonprofit institutions |
|---|---|---|---|---|---|---|
| 1953 | $ 441 | $ 101 | $ 151 | $ 110 | $ 33 | $ 46 |
| 1960 | 1,197 | 160 | 376 | 432 | 97 | 131 |
| 1965 | 2,555 | 364 | 592 | 1,136 | 208 | 253 |
| 1966 | 2,614 | 385 | 624 | 1,303 | 227 | 275 |
| 1967 | 3,056 | 435 | 629 | 1,457 | 250 | 285 |
| 1968 | 3,296 | 432 | 642 | 1,649 | 276 | 297 |
| 1969 | 3,441 | 532 | 616 | 1,711 | 275 | 305 |
| 1970 | 3,549 | 577 | 602 | 1,796 | 269 | 305 |
| 1971 | 3,672 | 586 | 590 | 1,914 | 260 | 322 |
| 1972 | 3,829 | 625 | 593 | 2,022 | 244 | 345 |
| 1973 | 3,946 | 608 | 631 | 2,053 | 297 | 357 |
| 1974 | 4,239 | 696 | 699 | 2,154 | 285 | 405 |
| 1975 | 4,608 | 734 | 730 | 2,410 | 309 | 425 |
| 1976 | 4,977 | 786 | 819 | 2,549 | 359 | 464 |
| 1977 | 5,537 | 914 | 911 | 2,800 | 402 | 510 |
| 1978 | 6,392 | 1,029 | 1,035 | 3,176 | 587 | 585 |
| 1979 | 7,257 | 1,089 | 1,158 | 3,612 | 716 | 680 |
| 1980 | 8,079 | 1,162 | 1,325 | 4,026 | 786 | 760 |
| 1981 | 9,180 | 1,302 | 1,614 | 4,576 | 863 | 825 |
| 1982 | 9,937 | 1,465 | 1,880 | 4,857 | 870 | 865 |
| 1983 | 11,039 | 1,690 | 2,152 | 5,269 | 983 | 945 |
| 1984 | 12,036 | 1,861 | 2,475 | 5,638 | 1,052 | 1,010 |
| 1985 | 13,081 | 1,923 | 2,628 | 6,377 | 1,078 | 1,075 |
| 1986 | 14,163 | 2,019 | 2,794 | 7,100 | 1,150 | 1,100 |
| 1987 | 14,950 | 2,220 | 3,000 | 7,370 | 1,200 | 1,160 |

Constant (1982) dollars[1]

| Year | Total | Federal Government | Industry | Universities and colleges | Associated FFRDCs | Other nonprofit institutions |
|---|---|---|---|---|---|---|
| 1953 | $ 1,695 | $ 387 | $ 583 | $ 421 | $ 126 | $178 |
| 1960 | 3,858 | 514 | 1,215 | 1,392 | 312 | 423 |
| 1965 | 7,568 | 1,079 | 1,753 | 3,372 | 616 | 749 |
| 1966 | 8,084 | 1,108 | 1,785 | 3,751 | 653 | 787 |
| 1967 | 8,505 | 1,211 | 1,750 | 4,055 | 696 | 793 |
| 1968 | 8,826 | 1,162 | 1,702 | 4,434 | 742 | 787 |
| 1969 | 8,744 | 1,357 | 1,554 | 4,365 | 702 | 767 |
| 1970 | 8,527 | 1,391 | 1,432 | 4,330 | 649 | 726 |
| 1971 | 8,377 | 1,342 | 1,329 | 4,384 | 596 | 726 |
| 1972 | 8,294 | 1,357 | 1,276 | 4,390 | 530 | 742 |
| 1973 | 8,112 | 1,257 | 1,274 | 4,246 | 614 | 721 |
| 1974 | 8,056 | 1,334 | 1,295 | 4,130 | 546 | 751 |
| 1975 | 7,951 | 1,276 | 1,231 | 4,190 | 537 | 717 |
| 1976 | 7,985 | 1,266 | 1,299 | 4,106 | 578 | 736 |
| 1977 | 8,253 | 1,364 | 1,354 | 4,177 | 600 | 758 |
| 1978 | 8,897 | 1,435 | 1,433 | 4,428 | 791 | 810 |
| 1979 | 9,296 | 1,398 | 1,474 | 4,637 | 922 | 865 |
| 1980 | 9,506 | 1,395 | 1,546 | 4,751 | 929 | 887 |
| 1981 | 9,828 | 1,397 | 1,716 | 4,909 | 926 | 878 |
| 1982 | 9,937 | 1,485 | 1,880 | 4,857 | 870 | 865 |
| 1983 | 10,602 | 1,621 | 2,072 | 5,055 | 943 | 910 |
| 1984 | 11,139 | 1,720 | 2,297 | 5,211 | 972 | 938 |
| 1985 | 11,727 | 1,722 | 2,364 | 5,710 | 965 | 967 |
| 1986 | 12,356 | 1,758 | 2,450 | 6,162 | 1,001 | 964 |
| 1987 | 12,664 | 1,879 | 2,545 | 6,239 | 1,016 | 984 |

[1]Based on GNP implicit price deflator

SOURCE: National Science Foundation, SRS

## Table B-9. Sources of funds for applied research by sector

[Dollars in millions]

### Current dollars

| Year | Total | Federal Government | Industry | Universities and colleges | Other nonprofit institutions |
|---|---|---|---|---|---|
| 1953 | $ 1,279 | $ 747 | $ 455 | $ 57 | $ 20 |
| 1960 | 3,020 | 1,588 | 1,226 | 66 | 40 |
| 1965 | 4,339 | 2,524 | 1,654 | 88 | 73 |
| 1966 | 4,601 | 2,582 | 1,841 | 89 | 89 |
| 1967 | 4,780 | 2,694 | 1,889 | 102 | 95 |
| 1968 | 5,131 | 2,610 | 2,125 | 97 | 99 |
| 1969 | 5,316 | 2,785 | 2,340 | 105 | 106 |
| 1970 | 5,720 | 3,060 | 2,427 | 98 | [illegible] |
| 1971 | 5,739 | 3,008 | 2,494 | 115 | 122 |
| 1972 | 5,984 | 3,104 | 2,615 | 140 | 125 |
| 1973 | 6,597 | 3,394 | 2,691 | 172 | 140 |
| 1974 | 7,228 | 3,534 | 3,332 | 203 | 159 |
| 1975 | 7,863 | 3,940 | 3,517 | 224 | 182 |
| 1976 | 9,046 | 4,534 | 4,003 | 283 | 226 |
| 1977 | 9,745 | 4,788 | 4,410 | 303 | 246 |
| 1978 | 10,844 | 5,229 | 4,981 | 354 | 280 |
| 1979 | 12,372 | 5,870 | 5,794 | 404 | 304 |
| 1980 | 14,050 | 6,599 | 6,695 | 426 | 326 |
| 1981 | 16,877 | 7,474 | 8,529 | 513 | 361 |
| 1982 | 18,516 | 8,135 | 9,416 | 588 | 379 |
| 1983 | 20,351 | 9,244 | 10,103 | 611 | 393 |
| 1984 | 22,186 | 9,971 | 11,095 | 680 | 440 |
| 1985 | 24,632 | 11,449 | 11,962 | 752 | 469 |
| 1986 | 24,752 | 10,862 | 12,590 | 810 | 490 |
| 1987 | 26,010 | 11,300 | 13,290 | 910 | 510 |

### Constant (1982) dollars[1]

| Year | Total | Federal Government | Industry | Universities and colleges | Other nonprofit institutions |
|---|---|---|---|---|---|
| 1953 | $ 4,922 | $ 2,870 | $ 1,757 | $216 | $ 77 |
| 1960 | 9,743 | 5,441 | 3,961 | 212 | 129 |
| 1965 | 12,849 | 7,475 | 4,896 | 261 | 216 |
| 1966 | 13,189 | 7,411 | 5,266 | 256 | 255 |
| 1967 | 13,301 | 7,497 | 5,256 | 284 | 264 |
| 1968 | 13,666 | 7,509 | 5,633 | 261 | 264 |
| 1969 | 13,428 | 7,059 | 5,833 | 268 | 268 |
| 1970 | 13,671 | 7,385 | 5,775 | 236 | 275 |
| 1971 | 13,005 | 6,845 | 5,620 | 263 | 277 |
| 1972 | 12,914 | 6,715 | 5,625 | 304 | 270 |
| 1973 | 13,437 | 6,959 | 5,837 | 356 | 285 |
| 1974 | 13,557 | 6,692 | 6,177 | 389 | 299 |
| 1975 | 13,407 | 6,775 | 5,932 | 389 | 311 |
| 1976 | 14,430 | 7,265 | 6,348 | 456 | 361 |
| 1977 | 14,504 | 7,131 | 6,555 | 452 | 366 |
| 1978 | 15,053 | 7,273 | 6,899 | 494 | 389 |
| 1979 | 15,795 | 7,513 | 7,375 | 519 | 388 |
| 1980 | 16,456 | 7,755 | 7,811 | 505 | 385 |
| 1981 | 16,008 | 7,994 | 9,078 | 550 | 386 |
| 1982 | 18,516 | 8,135 | 9,416 | 588 | 379 |
| 1983 | 19,574 | 8,883 | 9,727 | 586 | 378 |
| 1984 | 20,569 | 9,235 | 10,298 | 629 | 408 |
| 1985 | 22,129 | 10,275 | 10,755 | 673 | 421 |
| 1986 | 21,659 | 9,488 | 11,038 | 705 | 428 |
| 1987 | 22,054 | 9,576 | 11,276 | 770 | 432 |

[1]Based on GNP implicit price deflator

SOURCE National Science Foundation SRS

## Table B-10. Applied research performance by sector

[Dollars in millions]

### Current dollars

| Year | Total | Federal Government | Industry | Universities and colleges | Associated FFRDCs | Other nonprofit institutions |
|---|---|---|---|---|---|---|
| 1953 | $ 1,279 | $ 345 | $ 726 | $ 130 | $ 44 | $ 34 |
| 1960 | 3,020 | 595 | 2,029 | 179 | 122 | 95 |
| 1965 | 4,339 | 990 | 2,658 | 279 | 204 | 208 |
| 1966 | 4,601 | 997 | 2,843 | 328 | 207 | 226 |
| 1967 | 4,760 | 1,027 | 2,915 | 374 | 219 | 245 |
| 1968 | 5,131 | 1,110 | 3,126 | 404 | 231 | 262 |
| 1969 | 5,316 | 1,114 | 3,207 | 407 | 210 | 298 |
| 1970 | 5,720 | 1,327 | 3,427 | 427 | 216 | 323 |
| 1971 | 5,739 | 1,302 | 3,415 | 474 | 210 | 338 |
| 1972 | 5,984 | 1,360 | 3,514 | 524 | 221 | 365 |
| 1973 | 6,597 | 1,480 | 3,825 | 713 | 226 | 353 |
| 1974 | 7,228 | 1,574 | 4,288 | 736 | 217 | 413 |
| 1975 | 7,863 | 1,730 | 4,570 | 851 | 264 | 448 |
| 1976 | 9,046 | 2,093 | 5,112 | 1,016 | 327 | 498 |
| 1977 | 9,745 | 2,044 | 5,636 | 1,067 | 465 | 533 |
| 1978 | 10,844 | 2,192 | 6,300 | 1,213 | 549 | 590 |
| 1979 | 12,372 | 2,392 | 7,225 | 1,465 | 580 | 710 |
| 1980 | 14,050 | 2,4[illegible] | 8,450 | 1,691 | 700 | 725 |
| 1981 | 16,877 | [illegible] | 10,699 | 1,866 | 800 | 760 |
| 1982 | 18,516 | [illegible]29 | 12,175 | 2,004 | 795 | 815 |
| 1983 | 20,351 | 3,020 | 13,505 | 2,101 | 850 | 875 |
| 1984 | 22,188 | 2,903 | 15,028 | 2,390 | 950 | 915 |
| 1985 | 24,632 | 3,133 | 16,911 | 2,572 | 1,066 | 950 |
| 1986 | 24,752 | 3,141 | 16,711 | 2,900 | 1,050 | 950 |
| 1987 | 26,010 | 3,315 | 17,550 | 3,080 | 1,100 | 965 |

### Constant (1982) dollars[1]

| Year | Total | Federal Government | Industry | Universities and colleges | Associated FFRDCs | Other nonprofit institutions |
|---|---|---|---|---|---|---|
| 1953 | $ 4,922 | $1,321 | $ 2,804 | $ 498 | $168 | $131 |
| 1960 | 9,743 | 1,913 | 6,556 | 575 | 392 | 307 |
| 1965 | 12,849 | 2,933 | 7,869 | 827 | 604 | 616 |
| 1966 | 13,189 | 2,870 | 8,132 | 944 | 596 | 646 |
| 1967 | 13,301 | 2,858 | 8,111 | 1,041 | 610 | 682 |
| 1968 | 13,666 | 2,985 | 8,280 | 1,086 | 621 | 694 |
| 1969 | 13,428 | 2,842 | 8,263 | 1,038 | 536 | 749 |
| 1970 | 13,671 | 3,199 | 8,154 | 1 029 | 521 | 768 |
| 1971 | 13,005 | 2,982 | 7,695 | 1,086 | 481 | 762 |
| 1972 | 12,914 | 2,953 | 7,559 | 1,138 | 480 | 785 |
| 1973 | 13,437 | 3,061 | 7,721 | 1,475 | 467 | 713 |
| 1974 | 13,557 | 3,018 | 7,947 | 1,411 | 416 | 765 |
| 1975 | 13,407 | 3,008 | 7,705 | 1,479 | 459 | 755 |
| 1976 | 14,430 | 3,371 | 8,105 | 1,637 | 527 | 790 |
| 1977 | 14,504 | 3,049 | 8,377 | 1,592 | 694 | 792 |
| 1978 | 15,053 | 3,056 | 8,723 | 1,691 | 765 | [illegible]7 |
| 1979 | 15,795 | 3,071 | 9,196 | 1,881 | 745 | [illegible]04 |
| 1980 | 16,456 | 2,931 | 9,856 | [illegible]6 | 826 | 846 |
| 1981 | 16,008 | 2,931 | 11,387 | [illegible]2 | 658 | 830 |
| 1982 | 18,516 | 2,729 | 12,175 | 2 004 | 795 | 815 |
| 1983 | 19,574 | 2,897 | 13,003 | 2,016 | 816 | 842 |
| 1984 | 20,569 | 2,683 | 13,950 | 2,209 | 876 | 849 |
| 1985 | 22,129 | 2,605 | 15,212 | 2,303 | 954 | 855 |
| 1986 | 21,659 | 2,735 | 14,652 | 2,525 | 914 | 833 |
| 1987 | 22,054 | 2,806 | 14,891 | 2,607 | 931 | 819 |

[1]Based on GNP implicit price deflator

SOURCE National Science Foundation, SRS

## Table B-11. Sources of funds for development by sector

[Dollars in millions]

### Current dollars

| Year | Total | Federal Government | Industry | Universities and colleges | Other nonprofit institutions |
|---|---|---|---|---|---|
| 1953 | $ 3,404 | $ 1,755 | $ 1,637 | $ 5 | $ 7 |
| 1960 | 9,306 | 6,335 | 2,948 | 11 | 12 |
| 1965 | 13,150 | 8,679 | 4,433 | 15 | 23 |
| 1966 | 14,431 | 9,408 | 4,977 | 18 | 28 |
| 1967 | 15,310 | 9,500 | 5,761 | 20 | 29 |
| 1968 | 16,178 | 9,762 | 6,345 | 17 | 34 |
| 1969 | 16,874 | 9,669 | 7,150 | 17 | 38 |
| 1970 | 16,865 | 9,323 | 7,489 | 13 | 40 |
| 1971 | 17,265 | 9,427 | 7,781 | 14 | 43 |
| 1972 | 18,664 | 10,071 | 8,532 | 19 | 42 |
| 1973 | 20,175 | 10,296 | 9,797 | 33 | 49 |
| 1974 | 21,397 | 10,404 | 10,895 | 42 | 56 |
| 1975 | 22,742 | 11,030 | 11,598 | 47 | 67 |
| 1976 | 24,995 | 11,944 | 12,922 | 52 | 77 |
| 1977 | 27,501 | 12,965 | 14,369 | 58 | 89 |
| 1978 | 30,893 | 14,202 | 16,505 | 78 | 108 |
| 1979 | 35,304 | 15,901 | 19,196 | 85 | 122 |
| 1980 | 40,464 | 17,293 | 22,951 | 90 | 130 |
| 1981 | 45,783 | 19,720 | 25,827 | 101 | 135 |
| 1982 | 50,861 | 21,724 | 28,867 | 120 | 150 |
| 1983 | 55,814 | 24,156 | 31,367 | 126 | 165 |
| 1984 | 63,416 | 27,553 | 35,753 | 130 | 180 |
| 1985 | 69,723 | 31,400 | 37,988 | 145 | 190 |
| 1986 | 75,782 | 35,278 | 40,144 | 160 | 200 |
| 1987 | 82,090 | 39,380 | 42,310 | 190 | 210 |

### Constant (1982) dollars[1]

| Year | Total | Federal Government | Industry | Universities and colleges | Other nonprofit institutions |
|---|---|---|---|---|---|
| 1953 | $13,127 | $ 6,758 | $ 6,323 | $ 19 | $ 27 |
| 1960 | 30,049 | 20,450 | 9,525 | 35 | 39 |
| 1965 | 38,934 | 25,698 | 13,123 | 44 | 68 |
| 1966 | 41,317 | 26,949 | 14,236 | 52 | 80 |
| 1967 | 42,601 | 26,435 | 16,029 | 56 | 81 |
| 1968 | 42,965 | 26,012 | 16,817 | 46 | 90 |
| 1969 | 42,500 | 24,387 | 17,974 | 43 | 96 |
| 1970 | 40,206 | 22,261 | 17,818 | 31 | 95 |
| 1971 | 39,003 | 21,341 | 17,533 | 32 | 97 |
| 1972 | 40,206 | 21,722 | 18,352 | 41 | 90 |
| 1973 | 40,878 | 20,934 | 19,776 | 68 | 99 |
| 1974 | 39,854 | 19,478 | 20,191 | 81 | 105 |
| 1975 | 38,525 | 18,775 | 19,555 | 82 | 114 |
| 1976 | 39,719 | 19,025 | 20,489 | 84 | 122 |
| 1977 | 40,696 | 19,320 | 21,357 | 87 | 132 |
| 1978 | 42,819 | 19,707 | 22,854 | 109 | 150 |
| 1979 | 44,986 | 20,290 | 24,432 | 109 | 156 |
| 1980 | 47,273 | 20,240 | 26,775 | 106 | 152 |
| 1981 | 48,774 | 21,034 | 27,487 | 108 | 144 |
| 1982 | 50,861 | 21,724 | 28,867 | 120 | 150 |
| 1983 | 53,715 | 23,234 | 30,201 | 121 | 159 |
| 1984 | 58,833 | 25,544 | 33,002 | 120 | 167 |
| 1985 | 62,678 | 28,205 | 34,171 | 130 | 171 |
| 1986 | 68,383 | 30,870 | 35,198 | 139 | 175 |
| 1987 | 69,627 | 33,390 | 35,898 | 161 | 178 |

[1]Based on GNP implicit price deflator

SOURCE National Science Foundation, SRS

## Table B-12. Development performance by sector

[Dollars in millions]

### Current dollars

| Year | Total | Federal Government | Industry | Universities and colleges | Associated FFRDCs | Other nonprofit institutions |
|---|---|---|---|---|---|---|
| 1953 | $ 3,404 | $ 564 | $ 2,753 | $ 15 | $ 44 | $ 28 |
| 1960 | 9,306 | 971 | 8,104 | 34 | 141 | 56 |
| 1965 | 13,150 | 1,739 | 10,935 | 57 | 217 | 202 |
| 1966 | 14,431 | 1,838 | 12,081 | 84 | 196 | 232 |
| 1967 | 15,310 | 1,934 | 12,841 | 90 | 204 | 241 |
| 1968 | 16,178 | 1,952 | 13,663 | 96 | 212 | 255 |
| 1969 | 16,874 | 1,857 | 14,403 | 107 | 240 | 267 |
| 1970 | 16,865 | 2,175 | 14,038 | 112 | 252 | 288 |
| 1971 | 17,265 | 2,340 | 14,315 | 112 | 246 | 252 |
| 1972 | 18,664 | 2,605 | 15,445 | 84 | 288 | 242 |
| 1973 | 20,175 | 2,674 | 16,793 | 118 | 294 | 296 |
| 1974 | 21,397 | 2,841 | 17,900 | 133 | 363 | 360 |
| 1975 | 22,742 | 2,890 | 18,887 | 148 | 414 | 403 |
| 1976 | 24,995 | 2,890 | 21,066 | 184 | 461 | 414 |
| 1977 | 27,501 | 3,054 | 23,276 | 200 | 517 | 452 |
| 1978 | 30,893 | 3,590 | 25,969 | 236 | 601 | 497 |
| 1979 | 35,304 | 3,936 | 29,843 | 284 | 637 | 604 |
| 1980 | 40,464 | 3,966 | 34,730 | 343 | 760 | 665 |
| 1981 | 45,783 | 4,391 | 39,497 | 377 | 823 | 695 |
| 1982 | 50,861 | 4,947 | 43,940 | 415 | 814 | 745 |
| 1983 | 55,814 | 5,872 | 47,746 | 437 | 904 | 855 |
| 1984 | 63,416 | 6,806 | 53,967 | 475 | 1,116 | 1,050 |
| 1985 | 69,723 | 7,889 | 58,669 | 555 | 1,385 | 1,225 |
| 1986 | 75,782 | 8,375 | 64,057 | 600 | 1,400 | 1,350 |
| 1987 | 82,090 | 9,915 | 68,650 | 700 | 1,500 | 1,325 |

### Constant (1982) dollars[1]

| Year | Total | Federal Government | Industry | Universities and colleges | Associated FFRDCs | Other nonprofit institutions |
|---|---|---|---|---|---|---|
| 1953 | $13,127 | $2,159 | $10,633 | $ 57 | $ 168 | $ 108 |
| 1960 | 30,049 | 3,121 | 26,184 | 109 | 453 | 181 |
| 1965 | 38,934 | 5,153 | 32,371 | 169 | 643 | 598 |
| 1966 | 41,317 | 5,291 | 34,557 | 242 | 564 | 664 |
| 1967 | 42,601 | 5,383 | 35,729 | 250 | 568 | 671 |
| 1968 | 42,965 | 5,249 | 36,213 | 258 | 570 | 676 |
| 1969 | 42,500 | 4,737 | 36,207 | 273 | 612 | 671 |
| 1970 | 40,206 | 5,243 | 33,400 | 270 | 608 | 685 |
| 1971 | 39,003 | 5,360 | 32,256 | 257 | 563 | 568 |
| 1972 | 40,206 | 5,356 | 33,222 | 182 | 625 | 521 |
| 1973 | 40,878 | 5,431 | 33,898 | 244 | 608 | 597 |
| 1974 | 39,854 | 5,063 | 33,[illegible] | 255 | 696 | 667 |
| 1975 | 38,525 | 5,024 | 31,845 | 257 | 720 | 679 |
| 1976 | 39,719 | 4,655 | 33,401 | 264 | 743 | 656 |
| 1977 | 40,896 | 4,556 | 34,599 | 298 | 771 | 672 |
| 1978 | 42,819 | 5,006 | 35,958 | 329 | 838 | 688 |
| 1979 | 44,986 | 5,053 | 37,983 | 365 | 818 | 769 |
| 1980 | 47,273 | 4,680 | 40,516 | 405 | 897 | 776 |
| 1981 | 48,774 | 4,711 | 42,036 | 404 | 883 | 740 |
| 1982 | 50,861 | 4,947 | 43,940 | 415 | 814 | 745 |
| 1983 | 53,715 | 5,634 | 45,972 | 419 | 867 | 823 |
| 1984 | 58,833 | 6,293 | 50,095 | 439 | 1,032 | 975 |
| 1985 | 62,676 | 7,063 | 52,774 | 497 | 1,240 | 1,102 |
| 1986 | 66,383 | 7,292 | 56,166 | 522 | 1,219 | 1,184 |
| 1987 | 69,627 | 8,393 | 58,247 | 593 | 1,270 | 1,124 |

[1]Based on GNP implicit price deflator

SOURCE National Science Foundation, SRS

## Table B-13. Trends in Federal and non-Federal R&D outlays: 1953 and 1960–87

[Percents]

| Year | Federal | | | | Non-Federal |
|---|---|---|---|---|---|
| | Total | Defense related | Space related | Civilian related | |
| 1953 | 54% | 48% | 1% | 5% | 46% |
| 1960 | 65 | 52 | 3 | 9 | 35 |
| 1961 | 65 | 50 | 6 | 9 | 35 |
| 1962 | 64 | 48 | 7 | 9 | 36 |
| 1963 | 66 | 41 | 14 | 11 | 34 |
| 1964 | 66 | 37 | 19 | 9 | 34 |
| 1965 | 65 | 33 | 21 | 11 | 35 |
| 1966 | 64 | 33 | 19 | 12 | 36 |
| 1967 | 62 | 35 | 14 | 13 | 38 |
| 1968 | 61 | 35 | 13 | 13 | 39 |
| 1969 | 58 | 34 | 11 | 13 | 42 |
| 1970 | 57 | 33 | 10 | 14 | 43 |
| 1971 | 56 | 32 | 9 | 15 | 44 |
| 1972 | 56 | 32 | 9 | 15 | 44 |
| 1973 | 53 | 30 | 8 | 15 | 47 |
| 1974 | 51 | 27 | 8 | 16 | 49 |
| 1975 | 51 | 26 | 8 | 17 | 49 |
| 1976 | 51 | 26 | 8 | 17 | 49 |
| 1977 | 50 | 25 | 8 | 17 | 50 |
| 1978 | 50 | 24 | 7 | 19 | 50 |
| 1979 | 49 | 23 | 7 | 19 | 51 |
| 1980 | 47 | 22 | 7 | 18 | 53 |
| 1981 | 46 | 23 | 7 | 16 | 54 |
| 1982 | 46 | 25 | 7 | 14 | 54 |
| 1983 | 47 | 27 | 7 | 13 | 53 |
| 1984 | 46 | 28 | 6 | 12 | 54 |
| 1985 | 48 | 31 | 5 | 12 | 52 |
| 1986 (est.) | 48 | 32 | 4 | 12 | 52 |
| 1987 (est.) | 49 | 33 | 4 | 12 | 51 |

NOTE: Because of rounding, detail may not add to 100
SOURCE National Science Foundation, SRS

## Table B-14. Full-time-equivalent (FTE) scientists and engineers employed in research and development by sector: selected years[1]

[In thousands]

| Sector | 1954 | 1961 | 1965 | 1969 | 1972 | 1975 | 1978 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986[2] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 237.1 | 425.7 | 494 6 | 553.2 | 515 3 | 527.7 | 587 0 | 683 7 | 702 8 | 722 9 | 746 3 | 772.5 | 802.3 |
| Federal Government[3] | 37 7 | 51.1 | 61 8 | 66.5 | 61.4 | 58 4 | 57 1 | 59.2 | 60 0 | 61 3 | 6< 1 | 62.9 | 63.3 |
| Industry[4,5] | 164 1 | 312 0 | 348 4 | 385.6 | 353.9 | 363 8 | 414 2 | 498 8 | 518 0 | 533 3 | 552 4 | 570.3 | 595.2 |
| Universities and colleges, total | 25.0 | 42 4 | 53.4 | 68 3 | 66 5 | 69 8 | 76 6 | 83.3 | 84 4 | 85 5 | 88 6 | 93.2 | 96 7 |
| Scientists and engineers | 20 3 | 33 8 | 40 4 | 50 4 | 48 9 | 51.2 | 56 0 | 58.9 | 59.5 | 60.6 | 62.5 | 65.8 | 67 8 |
| Graduate students[6] | 4.7 | 8 8 | 13 0 | 17.9 | 17.6 | 18 6 | 20.6 | 24 4 | 24.9 | 24 9 | 26 1 | 27.4 | 28.9 |
| University-associated FFRDCs, total | 5 0 | 9.1 | 11.1 | 11.8 | 11 7 | 12.7 | 14 1 | 15 4 | 15 4 | 15 3 | 15 2 | 18.8 | 16 8 |
| Scientists and engineers | 4.9 | 8.8 | 10.7 | 11.1 | 11.3 | 12.3 | 13 7 | 15 0 | 15.0 | 14 9 | 14 8 | 18 2 | 16.2 |
| Graduate students[6] | .1 | .3 | 4 | 5 | 4 | 4 | 4 | .4 | 4 | 4 | 4 | 4 | 4 |
| Other nonprofit institutions[4] | 5.3 | 11.1 | 19 9 | 21 2 | 21.8 | 23 0 | 25 0 | 27 0 | 27 0 | 27.5 | 28 0 | 29 5 | 30 5 |

[1]Number of full-time employees plus the FTE of part-time employees. Excludes scientists and engineers employed in State and local government agencies. Totals may be understated by about 5 percent because of incomplete data on summer employment at universities and colleges
[2]Estimate.
[3]Includes both civilian and military service personnel and managers of research and development
[4]Includes professional R&D personnel employed at FFRDCs administered by organization in the sector.
[5]Excludes social scientists
[6]Numbers of FTE graduate students receiving stipends and engaged in research and development
NOTE The figures for the industry sector represent yearly averages.
SOURCE National Science Foundation, SRS

## Table B-15. National expenditures for performance of R&D as a percent of gross national product (GNP) by source

| Year | Total | Federal | Non-Federal |
|---|---|---|---|
| 1953 | 1 38% | 0 74% | 0 64% |
| 1954 | 1 52 | 84 | .67 |
| 1955 | 1.52 | .86 | 66 |
| | 1.95 | 1 13 | 82 |
| 19[illegible] | 2.1[illegible] | 1 35 | 81 |
| 1958 | 2.34 | 1.48 | 86 |
| 1959 | 2.49 | 1 62 | 87 |
| 1960 | 2 62 | 1 70 | 93 |
| 1961 | 2.68 | 1.73 | 95 |
| 1962 | 2.68 | 1.72 | 95 |
| 1963 | 2.81 | 1 85 | 96 |
| 1964 | 2 90 | 1 93 | 97 |
| 1965 | 2 84 | 1 85 | 1 00 |
| 1966 | 2 83 | 1.81 | 1 02 |
| 1967 | 2 84 | 1.76 | 1 07 |
| 1968 | 2.76 | 1.67 | 1 08 |
| 1969 | 2.66 | 1.55 | 1 11 |
| 1970 | 2 57 | 1 47 | 1.11 |
| 1971 | 2 42 | 1.36 | 1.06 |
| 1972 | 2.35 | 1 30 | 1 04 |
| 1973 | 2.2 | 1.21 | 1 05 |
| 1974 | 2.23 | 1 14 | 1 09 |
| 1975 | 2.20 | 1 13 | 1.07 |
| 1976 | 2 19 | 1.12 | 1.07 |
| 1977 | 2 15 | 1.08 | 1 06 |
| 1978 | 2 14 | 1.06 | 1 08 |
| 1979 | 2.19 | 1 07 | 1 12 |
| 1980 | 2 29 | 1.08 | 1.21 |
| 1981 | 2.35 | 1 09 | 1.26 |
| 1982 | 2.51 | 1.15 | 1.35 |
| 1983 | 2.56 | 1.19 | 1.37 |
| 1984 | 2.59 | 1.20 | 1 39 |
| 1985 | 2.68 | 1 28 | 1.40 |
| 1986 (est.) | 2.71 | 1 31 | 1.40 |
| 1987 (est ) | 2 74 | 1.34 | 1.40 |

SOURCES. National Science Foundation, SRS, and Department of Commerce

## Table B-16. Full-time equivalent R&D scientists and engineers and employed civilian labor force: selected years

[In thousands]

| Year | R&D scientists and engineers | Employed civilian labor force |
|---|---|---|
| 1967 | 534.4 | 74,372 |
| 1969 | 553 2 | 77,902 |
| 1971 | 524.0 | 79,367 |
| 1973 | 514 8 | 85,064 |
| 1975 | 527.7 | 85,846 |
| 1977 | 561.0 | 92,017 |
| 1979 | 614.8 | 98,824 |
| 1981 | 683.7 | 100,397 |
| 1983 | 722.9 | 100,834 |
| 1985 | 772.5 | 107,150 |
| 1986 (est.) | 802.3 | 109,597 |

SOURCES: National Science Foundation, SRS, and Department of Labor

## Table B-17. National expenditures for performance of R&D as a percent of gross national product (GNP) by country: 1967–86

| Year | France | West Germany | Japan | United Kingdom | United States |
|---|---|---|---|---|---|
| 1967 | 2 1% | 2.0% | 1 5% | 2 3% | 2.8% |
| 1968 | 2 1 | 2 0 | 1 6 | 2 3 | 2 8 |
| 1969 | 1 9 | 1.8 | 1 6 | 2 3 | 2.7 |
| 1970 | 1 9 | 2 1 | 1 9 | NA | 2 6 |
| 1971 | 1 9 | 2 2 | 1 9 | NA | 2 4 |
| 1972 | 1 9 | 2 2 | 1 9 | 2.1 | 2.3 |
| 1973 | 1 8 | 2 1 | 1 9 | NA | 2.3 |
| 1974 | 1 8 | 2 1 | 2.0 | NA | 2.2 |
| 1975 | 1 8 | 2.2 | 2 0 | 2 2 | 2.2 |
| 1976 | 1 8 | 2 2 | 1 9 | NA | 2.2 |
| 1977 | 1 8 | 2 1 | 1 9 | NA | 2 1 |
| 1978 | 1 8 | 2 2 | 2 0 | 2.2 | 2 1 |
| 1979 | 1 8 | 2 4 | 2 1 | NA | 2 2 |
| 1980 | 1 8 | 2 4 | 2.2 | NA | 2.3 |
| 1981 | 2 0 | 2.4 | 2 4 | 2 4 | 2 4 |
| 1982 | 2 1 | 2.5 | 2 5 | NA | 2.5 |
| 1983 | 2 2 | 2.5 | 2 6 | 2 2 | 2 6 |
| 1984 (prel ) | 2 2 | 2 5 | 2 6 | NA | 2 6 |
| 1985 (est ) | 2 3 | 2 7 | 2 8 | 2.2 | 2 7 |
| 1986 (est ) | 2 4 | 2 7 | NA | NA | 2 7 |

NOTE. NA = Not available
SOURCES National Science Foundation, SRS, and Organisation for Economic Co-operation and Development

## Table B-18. Scientists and engineers[1] engaged in R&D per 10,000 labor force population by country: 1967–85

| Year | France | West Germany | Japan | United Kingdom | United States |
|---|---|---|---|---|---|
| 1967 | 25.3 | 24 9 | 27.8 | NA | 67 2 |
| 1968 | 26.4 | 26 2 | 31 1 | 20.8 | 68 0 |
| 1969 | 27 1 | 28 4 | 30 8 | NA | 66 7 |
| 1970 | 27.3 | 30 8 | 33 4 | NA | 64 1 |
| 1971 | 27.9 | 33 4 | 37 5 | NA | 60 7 |
| 1972 | 28.2 | 35 6 | 38 1 | 30 4 | 58 0 |
| 1973 | 28 5 | 37 1 | 42 5 | NA | 56.4 |
| 1974 | 28.9 | 37 8 | 44.9 | NA | 55 6 |
| 1975 | 29 4 | 38 6 | 47 9 | 31 1 | 55 3 |
| 1976 | 29 9 | 39 2 | 48 4 | NA | 54.8 |
| 1977 | 30 0 | 41 8 | 49.9 | NA | 55 7 |
| 1978 | 31 0 | NA | 49.4 | 33 3 | 56 5 |
| 1979 | 31 6 | 45 3 | 50 4 | NA | 57 7 |
| 1980 | 32.4 | NA | 53 6 | NA | 60 0 |
| 1981 | 36.3 | 46 5 | 55 6 | 35.8 | 62 0 |
| 1982 | 37.9 | 47 0 | 57 1 | NA | 62.8 |
| 1983 | 39 1 | 48 4 | 58.1 | 35 1 | 63.8 |
| 1984 | 41 2 | 49.1 | 62.4 | 34 2 | 65 1 |
| 1985 | NA | NA | 63.2 | 32 8 | 67 4 |

[1]Includes all scientists and engineers engaged in R&D on a full-time-equivalent basis (except Japan whose data include persons primarily employed in R&D and the United Kingdom whose data include only the government and industry sectors)
NOTE. NA = Not available
SOURCES: National Science Foundation, SRS, U S. Department of Labor, and Organisation for Economic Co-operation and Development

## Table B-19. Estimated ratio of civilian R&D expenditures[1] to gross national product (GNP) for selected countries: 1971–86

| Year | France | West Germany | Japan | United Kingdom | United States |
|---|---|---|---|---|---|
| 1971 | 1 5% | 2.0% | 1.8% | NA | 1 6% |
| 1972 | 1.5 | 2 1 | 1 8 | 1 6 | 1 6 |
| 1973 | 1 4 | 1 9 | 1 9 | NA | 1 6 |
| 1974 | 1.4 | 2 0 | 2.0 | NA | 1 6 |
| 1975 | 1 5 | 2 1 | 1 9 | 1 6 | 1.6 |
| 1976 | 1 4 | 2.0 | 1 9 | NA | 1.6 |
| 1977 | 1 4 | 2.0 | 1 9 | NA | 1.6 |
| 1978 | 1 4 | 2 1 | 2 0 | 1 6 | 1 6 |
| 1979 | 1 4 | 2 3 | 2 1 | NA | 1 7 |
| 1980 | 1 4 | 2 3 | 2 2 | NA | 1 8 |
| 1981 | 1.5 | 2 3 | 2 4 | 1 7 | 1 8 |
| 1982 | 1 6 | 2 4 | 2 5 | NA | 1 9 |
| 1983 | 1 7 | 2 4 | 2 6 | 1 5 | 1 9 |
| 1984 (prel ) | 1 8 | 2 4 | 2 6 | NA | 1 8 |
| 1985 (est ) | 1 8 | 2 5 | 2 8 | 1 5 | 1 8 |
| 1986 (est ) | 1 9 | 2.6 | NA | NA | 1 8 |

[1]National R&D expenditures, excluding government funds for defense
NOTE NA = Not available
SOURCES National Science Foundation, SRS, and Organisation for Economic Co-operation and Development

TABLE B-20. FEDERAL OBLIGATIONS FOR RESEARCH AND DEVELOPMENT, BY AGENCY: FISCAL YEARS 1978-87

(THOUSANDS OF DOLLARS)

| FISCAL YEAR | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | ESTIMATES 1987 |
|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL, ALL AGENCIES .. | 25,845,137 | 28,145,142 | 29,830,432 | 33,103,924 | 36,432,589 | 38,711,537 | 42,224,865 | 48,359,565 | 51,412,364 | 56,491,629 |
| DEPT OF AGRIC, TOTAL . | 621 282 | 663,825 | 687,586 | 773,956 | 797,274 | 847,605 | 866,171 | 942,979 | 928,528 | 978,865 |
| FOREST SERVICE ..... | 105,617 | 107,580 | 111,531 | 126,055 | 112,145 | 107,672 | 108,359 | 113,143 | 113,317 | 125,763 |
| SCI & ED ADMIN 1/... | 482,965 | 518,393 | 536,016 | - | - | - | - | - | - | - |
| AGRIC RESEARCH ... | 325,541 | 345,836 | 351,811 | - | - | - | - | - | - | - |
| AGRIC COOPERATIVE RESEARCH ..... | 157,424 | 172,557 | 184,205 | - | - | - | - | - | - | - |
| OTHER AGRICULTURE .. | 32,700 | 37,132 | 8,988 | 647,903 | 685,129 | 739,933 | 757,812 | 829,836 | 815,211 | 853,182 |
| DEPT OF COMMERCE, TOTAL ..... | 283,665 | 389,359 | 327,549 | 327,925 | 333,278 | 336,992 | 358,226 | 398,759 | 399,166 | 407,598 |
| NATIONAL BUREAU OF STANDARDS ..... | 58,306 | 67,800 | 76,167 | 82,518 | 88,837 | 95,831 | 95,531 | 108,534 | 100,787 | 108,223 |
| NATIONAL OCEANIC & ATMOS ADMIN .... | 161,450 | 171,176 | 199,750 | 201,351 | 222,026 | 222,837 | 244,300 | 269,788 | 274,665 | 288,464 |
| OTHER COMMERCE ..... | 63,909 | 78,383 | 66,632 | 44,056 | 25,415 | 17,924 | 18,395 | 28,437 | 23,714 | 18,911 |
| DEPT OF DEFENSE, TOTAL | 11,553,638 | 12,506,225 | 13,981,812 | 16,506,649 | 28,622,574 | 22,992,789 | 25,372,878 | 29,791,584 | 32,937,939 | 36,243,932 |
| ARMY ..... | 2,548,927 | 2,768,674 | 2,979,987 | 3,244,159 | 3,768,489 | 3,998,085 | 4,225,532 | 4,578,793 | 4,809,378 | 4,981,899 |
| NAVY ..... | 3,998,416 | 4,335,042 | 4,706,132 | 5,005,952 | 5,845,056 | 6,068,206 | 7,685,590 | 9,127,432 | 9,650,289 | 9,583,054 |
| AIR FORCE ..... | 4,262,349 | 4,525,616 | 5,211,029 | 6,969,247 | 9,357,858 | 18,812,616 | 12,091,645 | 13,260,917 | 13,593,790 | 15,759,738 |
| DEFENSE AGENCIES ... | 707,886 | 847,583 | 1,045,984 | 1,248,240 | 1,618,134 | 2,052,380 | 1,391,540 | 2,781,726 | 4,767,588 | 5,833,332 |
| OTHER DEFENSE ..... | 36,860 | 29,310 | 37,880 | 41,051 | 41,037 | 61,582 | 58,563 | 50,638 | 117,102 | 165,917 |
| DEPT OF EDUCATION 2/.. | 123,772 | 166,288 | 139,372 | - | 127,981 | 111,681 | 115,702 | 124,866 | 121,308 | 137,918 |
| DEPT OF ENERGY ..... | 4,244,827 | 4,638,766 | 4,753,688 | 4,918,225 | 4,788,158 | 4,536,682 | 4,673,578 | 4,966,888 | 4,688,384 | 4,851,366 |
| DEPT OF HEALTH & HUMAN SERVICES, TOTAL 3/ | 3,983,482 | 3,584,888 | 3,763,221 | 3,927,141 | 3,940,745 | 4,352,530 | 4,830,693 | 5,451,836 | 5,657,604 | 6,342,589 |
| NAT'L INST OF HEALTH | 2,580,862 | 2,953,133 | 3,181,830 | 3,333,249 | 3,433,148 | 3,789,222 | 4,257,436 | 4,827,737 | 5,885,100 | 5,557,288 |
| OTHER HHS ..... | 502,620 | 551,747 | 598,391 | 593,892 | 507,597 | 563,308 | 573,257 | 623,299 | 652,504 | 785,389 |
| DEPT OF HOUSING & URBAN DEV ..... | 69,723 | 67,915 | 56,825 | 48,108 | 28,855 | 32,090 | 18,236 | 18,532 | 15,384 | 18,788 |
| DEPT OF THE INTERIOR, TOTAL ..... | 358,974 | 405,778 | 411,258 | 427,105 | 381,074 | 382,473 | 410,877 | 391,685 | 385,219 | 484,761 |
| BUREAU OF MINES .... | 113,968 | 121,004 | 113,373 | 96,744 | 94,787 | 88,533 | 108,777 | 89,474 | 84,358 | 95,349 |
| GEOLOGICAL SURVEY .. | 133,656 | 145,571 | 146,339 | 169,777 | 152,560 | 157,004 | 208,881 | 214,986 | 218,620 | 223,109 |
| OTHER INTERIOR .... | 111,350 | 139,203 | 151,546 | 168,584 | 133,807 | 136,936 | 93,219 | 86,905 | 82,249 | 86,303 |
| DEPT OF JUSTICE ..... | 60,919 | 42,991 | 41,501 | 26,527 | 26,692 | 31,376 | 24,528 | 35,992 | 36,468 | 41,093 |
| DEPT OF LABOR ..... | 97,835 | 136,977 | 138,853 | 62,188 | 25,410 | 19,8.7 | 16,259 | 13,287 | 10,394 | 13,869 |
| DEPT OF STATE ..... | 2,848 | 3,168 | 2,206 | 1,766 | 1,549 | 1,488 | 1,550 | 1,482 | 1,464 | 7,628 |
| DEPT OF TRANS, TOTAL . | 488,250 | 378,889 | 361,230 | 415,539 | 318,083 | 347,728 | 448,335 | 428,859 | 385,474 | 318,098 |
| FED AVIATION ADMIN . | 110,500 | 110,500 | 103,100 | 128,000 | 94,300 | 126,288 | 266,102 | 286,308 | 260,600 | 171,008 |
| OTHER TRANSPORTATION | 297,750 | 259,589 | 258,130 | 295,539 | 215,783 | 221,528 | 182,153 | 142,559 | 124,874 | 139,0?? |
| DEPT OF THE TREASURY . | 9,878 | 9,541 | 12,033 | 11,306 | 13,323 | 15,583 | 13,853 | 24,385 | 24,011 | 25,474 |
| OTHER AGENCIES | | | | | | | | | | |
| ENVIRON'L PROTECTION AGENCY ..... | 384,636 | 418,100 | 345,000 | 325,708 | 335,089 | 248,789 | 261,172 | 320,413 | 317,319 | 329,152 |
| NAT'L AERONAUTICS & SPACE ADMIN ..... | 3,333,260 | 3,578,404 | 3,234,088 | 3,593,155 | 3,077,859 | 2,661,579 | 2,821,900 | 3,327,208 | 3,419,800 | 4,184,600 |
| NAT'L SCI FOUNDATION . | 748,775 | 807,925 | 881,792 | 961,564 | 975,327 | 1,061,990 | 1,202,620 | 1,345,583 | 1,353,335 | 1,462,708 |
| NUCLEAR REGULATORY COMMISSION ..... | 133,891 | 148,772 | 182,672 | 219,667 | 220,287 | 207,295 | 198,675 | 149,959 | 123,785 | 111,685 |
| VETERANS ADMIN ..... | 113,991 | 127,004 | 133,480 | 144,400 | 137,300 | 161,400 | 198,300 | 226,008 | 186,200 | 289,708 |
| ALL OTHER ..... | 211,491 | 247,935 | 346,746 | 386,139 | 366,731 | 371,678 | 407,128 | 488,088 | 419,782 | 488,864 |

1/ THE SCIENCE AND EDUCATION ADMINISTRATION WAS ESTABLISHED IN FY 1977.

2/ DEPARTMENT OF EDUCATION DATA SHOWN FOR FISCAL YEAR 1978 ARE COMPOSED OF DATA FOR THE OFFICE OF EDUCATION, THE NATIONAL INSTITUTE OF EDUCATION, AND THE ASSISTANT SECRETARY FOR EDUCATION OF THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE (HEW).

3/ THE DEPARTMENT OF HEALTH AND HUMAN SERVICES WAS ESTABLISHED IN FY 1979; DATA SHOWN FOR PRIOR YEARS ARE HEW AMOUNTS MINUS EDUCATION PROGRAMS.

SOURCE: NATIONAL SCIENCE FOUNDATION, SRS

## Table B-21. Federal R&D funding by budget function: fiscal years 1978–87

[Dollars in millions]

| Function | Actual | | | | | | | | | Estimate |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
| Total | $25,976 | $28,208 | $29,739 | $33,735 | $36,115 | $38,768 | $44,214 | $49,887 | $53,192 | $58,148 |
| National defense | 12,899 | 13,791 | 14,946 | 18,413 | 22,070 | 24,936 | 29,287 | 33,698 | 36,926 | 40,260 |
| Health | 2,968 | 3,401 | 3,694 | 3,871 | 3,869 | 4,298 | 4,779 | 5 418 | 5,565 | 6,608 |
| Space research and technology | 2,939 | 3,136 | 2,738 | 3,111 | 2,584 | 2,134 | 2,300 | 2,725 | 2,894 | 3,344 |
| General science | 1,050 | 1,119 | 1,233 | 1,340 | 1,359 | 1,502 | 1,676 | 1,862 | 1,873 | 2,041 |
| Energy | 3,134 | 3,461 | 3,603 | 3,501 | 3,012 | 2,578 | 2,581 | 2,389 | 2,286 | 2,155 |
| Natural resources and environment | 904 | 1,010 | 999 | 1,061 | 965 | 952 | 963 | 1,059 | 1,062 | 1,083 |
| Transportation | 768 | 798 | 887 | 869 | 791 | 876 | 1,040 | 1,030 | 917 | 889 |
| Agriculture | 501 | 552 | 585 | 659 | 693 | 745 | 762 | E36 | 815 | 865 |
| International affairs | 57 | 117 | 125 | 160 | 165 | 177 | 192 | 210 | :11 | 217 |
| Education, training, employment and social services | 345 | [illegible] | 469 | 298 | 228 | 189 | 200 | 220 | 248 | 253 |
| Veterans benefits and services | 111 | 123 | 126 | 143 | 139 | 157 | 218 | 193 | 183 | 215 |
| Commerce and housing credit | 77 | 93 | 101 | 106 | 104 | 107 | 110 | 114 | 111 | 112 |
| Administration of justice | 44 | 47 | 45 | 34 | 31 | 37 | 24 | 47 | 41 | 42 |
| Community and regional development | 92 | 127 | 119 | 104 | 63 | 44 | 46 | 50 | 32 | 29 |
| Income security | 67 | 57 | 47 | 43 | 32 | 32 | 26 | 21 | 14 | 22 |
| General government | 20 | 23 | 22 | 22 | 10 | 6 | 8 | 17 | 14 | 15 |

NOTE: Data for 1978–86 are shown in actual budget authority. Data for 1987 are estimates based on the FY 1988 budget.
SOURCE: National Science Foundation, SRS

TABLE B-22. FEDERAL OBLIGATIONS FOR BASIC RESEARCH BY AGENCY: FISCAL YEARS 1978-87

(THOUSANDS OF DOLLARS)

| AGENCY AND SUBDIVISION | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | ESTIMATES 1987 |
|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL, ALL AGENCIES | 3,698,604 | 4,192,665 | 4,674,156 | 5,041,295 | 5,481,685 | 6,260,131 | 7,867,359 | 7,818,682 | 8,153,076 | 8,021,058 |
| DEPT OF AGRICULTURE | 242,704 | 256,420 | 275,650 | 314,128 | 330,755 | 362,019 | 392,649 | 445,388 | 432,857 | 454,635 |
| DEPT OF COMMERCE | 11,806 | 11,900 | 15,910 | 16,204 | 16,867 | 19,221 | 20,613 | 23,227 | 26,523 | 23,014 |
| DEPT OF DEFENSE, TOTAL | 418,410 | 471,527 | 540,341 | 604,285 | 686,684 | 785,620 | 847,857 | 861,407 | 923,915 | 861,220 |
| ARMY | 106,073 | 115,060 | 132,190 | 148,089 | 187,662 | 208,320 | 222,090 | 240,753 | 248,450 | 208,038 |
| NAVY | 172,088 | 192,122 | 214,900 | 258,000 | 280,300 | 305,400 | 315,765 | 343,110 | 337,267 | 341,992 |
| AIR FORCE | 95,100 | 105,025 | 108,200 | 125,800 | 145,800 | 164,200 | 192,359 | 198,298 | 216,483 | 205,097 |
| DEFENSE AGENCIES | 39,149 | 59,340 | 85,051 | 92,396 | 72,922 | 107,700 | 117,643 | 79,246 | 121,715 | 106,093 |
| OTHER DEFENSE | - | - | - | - | - | - | - | - | - | - |
| DEPT OF EDUCATION 1/ | 18,276 | 20,567 | 17,583 | 20,576 | 14,199 | 14,182 | 12,221 | 14,642 | 4,522 | 5,323 |
| DEPT OF ENERGY | 440,534 | 462,968 | 523,136 | 586,348 | 642,211 | 767,718 | 830,432 | 942,592 | 959,668 | 1,078,287 |
| DEPT OF HEALTH & HUMAN SERVICES, TOTAL 2/ | 1,274,063 | 1,576,011 | 1,762,668 | 1,908,384 | 2,144,694 | 2,475,400 | 2,814,525 | 3,232,547 | 3,338,767 | 3,661,036 |
| NAT'L INST OF HEALTH | 1,181,094 | 1,463,703 | 1,642,341 | 1,766,788 | 2,020,650 | 2,313,026 | 2,624,774 | 3,018,004 | 3,118,600 | 3,384,335 |
| OTHER HHS | 92,969 | 112,308 | 120,327 | 133,596 | 124,044 | 162,374 | 189,751 | 214,543 | 220,167 | 276,701 |
| DEPT OF THE INTERIOR | 65,876 | 72,522 | 71,634 | 80,663 | 76,454 | 103,033 | 125,921 | 138,274 | 132,986 | 140,874 |
| DEPT OF TRANSPORTATION | - | - | - | 1,210 | 1,000 | 900 | 3,481 | 1,063 | 608 | 191 |
| OTHER AGENCIES | | | | | | | | | | |
| ENVIRON'L PROTECTION AGENCY | 6,010 | 10,100 | 13,690 | 10,500 | 32,607 | 22,217 | 29,625 | 38,634 | 38,489 | 38,439 |
| NATIONAL AERONAUTICS & SPACE ADMIN | 479,729 | 512,847 | 559,113 | 531,122 | 535,733 | 617,033 | 754,500 | 750,900 | 916,700 | 1,068,800 |
| NAT'L SCI FOUNDATION | 678,040 | 733,255 | 815,246 | 896,569 | 916,078 | 999,136 | 1,132,340 | 1,261,807 | 1,275,221 | 1,378,329 |
| NUCLEAR REGULATORY COMMISSION | - | - | - | - | - | - | - | - | - | - |
| SMITHSONIAN INST | 34,896 | 36,901 | 41,086 | 44,861 | 52,357 | 55,960 | 63,613 | 71,063 | 63,273 | 72,773 |
| VETERANS ADMIN | 8,891 | 9,523 | 14,300 | 15,000 | 12,900 | 14,100 | 15,800 | 15,400 | 14,800 | 15,500 |
| ALL OTHER | 27,369 | 18,124 | 23,969 | 19,453 | 18,986 | 23,592 | 23,782 | 21,738 | 24,747 | 2?,837 |

1/ DEPARTMENT OF EDUCATION DATA SHOWN FOR 1978 ARE COMPOSED OF DATA FOR THE OFFICE OF EDUCATION, THE NATIONAL INSTITUTE OF EDUCATION, AND THE ASSISTANT SECRETARY FOR EDUCATION OF THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE (HEW).

2/ THE DEPARTMENT OF HEALTH AND HUMAN SERVICES WAS ESTABLISHED IN FY 1979; DATA SHOWN FOR PRIOR YEARS ARE HEW AMOUNTS MINUS EDUCATION PROGRAMS.

SOURCE: NATIONAL SCIENCE FOUNDATION, SRS

TABLE B-23. FEDERAL OBLIGATIONS FOR APPLIED RESEARCH BY AGENCY: FISCAL YEARS 1978-87

(THOUSANDS OF DOLLARS)

| AGENCY AND SUBDIVISION | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | ESTIMATES 1987 |
|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL, ALL AGENCIES .. | 5,988,154 | 6,342,340 | 6,923,222 | 7,171,485 | 7,540,589 | 7,993,394 | 7,911,414 | 8,314,739 | 8,349,123 | 8,990,931 |
| DEPT OF AGRICULTURE .. | 351,780 | 375,500 | 381,785 | 426,856 | 435,708 | 455,539 | 442,238 | 465,552 | 463,549 | 490,681 |
| DEPT OF COMMERCE ..... | 180,969 | 207,558 | 238,523 | 233,171 | 259,188 | 265,620 | 276,868 | 308,952 | 312,936 | 329,086 |
| DEPT OF DEFENSE, TOTAL | 1,413,648 | 1,542,571 | 1,721,428 | 1,996,615 | 2,266,137 | 2,437,029 | 2,200,674 | 2,306,876 | 2,303,348 | 2,333,861 |
| ARMY ..... | 305,737 | 333,570 | 347,865 | 388,366 | 451,561 | 485,291 | 486,692 | 582,631 | 578,838 | 613,629 |
| NAVY ..... | 354,279 | 375,193 | 396,200 | 460,000 | 498,400 | 521,600 | 449,598 | 448,222 | 447,075 | 419,602 |
| AIR FORCE ..... | 353,645 | 387,228 | 429,103 | 491,500 | 488,100 | 524,200 | 547,739 | 538,355 | 542,474 | 504,489 |
| DEFENSE AGENCIES ... | 392,537 | 446,580 | 549,063 | 656,749 | 828,076 | 905,938 | 716,645 | 737,668 | 734,961 | 796,141 |
| OTHER DEFENSE ..... | 7,500 | - | - | - | - | - | - | - | - | - |
| DEPT OF EDUCATION 1/.. | 30,967 | 72,825 | 69,992 | 33,212 | 56,268 | 61,885 | 68,680 | 77,263 | 91,317 | 102,548 |
| DEPT OF ENERGY ..... | 661,709 | 668,878 | 754,190 | 827,265 | 1,053,877 | 1,193,409 | 1,194,457 | 1,198,445 | 1,080,653 | 1 07 38 |
| DEPT OF HEALTH & HUMAN SERVICES, TOTAL 2/ | 1,417,411 | 1,439,658 | 1,570,109 | 1,591,857 | 1,460,890 | 1,545,446 | 1,651,498 | 1,795,787 | 1,850,791 | 2,160,249 |
| NAT'L INST OF HEALTH | 1,051,502 | 1,066,408 | 1,145,129 | 1,181,521 | 1,103,802 | 1,165,179 | 1,285,643 | 1,410,113 | 1,469,000 | 1,694,946 |
| OTHER HHS ..... | 365,909 | 373,250 | 424,980 | 410,336 | 357,088 | 380,267 | 365,855 | 385,674 | 381,791 | 465,303 |
| DEPT OF THE INTERIOR . | 217,616 | 266,946 | 282,812 | 289,174 | 275,806 | 254,675 | 254,303 | 230,978 | 234,926 | 244,037 |
| DEPT OF TRANSPORTATION | 66,500 | 66,983 | 82,445 | 87,379 | 65,685 | 71,696 | 74,211 | 70,163 | 67,615 | 75,488 |
| OTHER AGENCIES | | | | | | | | | | |
| ENVIRON'L PROTECTION AGENCY ..... | 246,660 | 248,900 | 231,500 | 207,800 | 210,692 | 152,380 | 142,336 | 175,994 | 179,292 | 171,202 |
| NATIONAL AERONAUTICS & SPACE ADMIN ..... | 865,438 | 938,389 | 1,050,531 | 876,036 | 871,407 | 927,727 | 954,700 | 1,032,700 | 1,152,360 | 1,410,600 |
| NAT'L SCI FOUNDATION . | 65,462 | 66,770 | 58,441 | 58,895 | 57,087 | 62,854 | 70,480 | 83,776 | 78,114 | 84,371 |
| NUCLEAR REGULATORY COMMISSION ..... | 133,891 | 148,772 | 182,672 | 219,667 | 220,287 | 207,295 | 170,675 | 149,959 | 123,735 | 111,685 |
| SMITHSONIAN INST ..... | - | - | - | - | - | - | - | - | - | - |
| VETERANS ADMIN ..... | 90,589 | 101,839 | 103,600 | 113,700 | 110,100 | 132,000 | 156,100 | 193,700 | 155,100 | 173,800 |
| ALL OTHER ..... | 165,594 | 196,751 | 195,194 | 218,858 | 198,248 | 225,779 | 234,974 | 232,594 | 255,397 | 230,885 |

1/ DEPARTMENT OF EDUCATION DATA SHOWN FOR 1978 ARE COMPOSED OF DATA FOR THE OFFICE OF EDUCATION, THE NATIONAL INSTITUTE OF EDUCATION, AND THE ASSISTANT SECRETARY FOR EDUCATION OF THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE (HEW).

2/ THE DEPARTMENT OF HEALTH AND HUMAN SERVICES WAS ESTABLISHED IN FY 1979; DATA SHOWN FOR PRIOR YEARS ARE HEW AMOUNTS MINUS EDUCATION PROGRAMS.

SOURCE: NATIONAL SCIENCE FOUNDATION, SRS

TABLE B-24. FEDERAL OBLIGATIONS FOR DEVELOPMENT BY AGENCY: FISCAL YEARS 1978-87

(THOUSANDS OF DOLLARS)

| AGENCY AND SUBDIVISION | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | ESTIMATES 1987 |
|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL, ALL AGENCIES .. | 16,238,379 | 17,610,137 | 18,233,054 | 20,891,144 | 23,410,404 | 24,458,012 | 27,246,092 | 32,226,144 | 34,910,165 | 38,679,640 |
| DEPT OF AGRICULTURE .. | 26,798 | 31,105 | 30,151 | 32,974 | 30,811 | 30,047 | 31,284 | 32,039 | 32,122 | 33,549 |
| DEPT OF COMMERCE ..... | 90,890 | 89,901 | 88,116 | 78,550 | 60,223 | 50,151 | 61,525 | 74,580 | 59,707 | 54,698 |
| DEPT OF DEFENSE, TOTAL | 9,729,580 | 10,492,127 | 11,719,243 | 13,907,749 | 17,669,753 | 19,770,140 | 22,324,339 | 26,623,221 | 29,710,676 | 33,048,851 |
| ARMY ..... | 2,139,117 | 2,320,064 | 2,500,732 | 2,707,706 | 3,121,266 | 3,304,474 | 3,516,750 | 3,747,409 | 3,982,082 | 4,160,232 |
| NAVY ..... | 3,472,099 | 3,767,727 | 4,095,032 | 4,307,952 | 5,066,356 | 5,241,206 | 6,840,227 | 8,336,100 | 8,865,967 | 8,741,460 |
| AIR FORCE ..... | 3,813,604 | 4,033,363 | 4,673,729 | 6,351,947 | 8,723,958 | 10,124,216 | 11,351,547 | 12,524,764 | 12,834,833 | 15,050,144 |
| DEFENSE AGENCIES ... | 276,200 | 341,663 | 411,870 | 499,095 | 717,136 | 1,038,662 | 557,252 | 1,964,810 | 3,910,712 | 4,931,098 |
| OTHER DEFENSE ..... | 28,560 | 29,310 | 37,880 | 41,051 | 41,037 | 61,582 | 58,563 | 50,638 | 117,102 | 165,917 |
| DEPT OF EDUCATION 1/.. | 74,529 | 72,896 | 51,797 | 51,074 | 57,514 | 35,614 | 34,801 | 32,961 | 25,469 | 30,047 |
| DEPT OF ENERGY ..... | 3,142,584 | 3,506,920 | 3,476,362 | 3,504,620 | 3,012,070 | 2,575,555 | 2,648,689 | 2,824,971 | 2,647,983 | 700,641 |
| DEPT OF HEALTH & HUMAN SERVICES, TOTAL 2/ | 392,008 | 489,211 | 447,444 | 434,900 | 335,161 | 331,684 | 364,670 | 422,702 | 468,046 | 521,224 |
| NAT'L INST OF HEALTH | 348,266 | 423,022 | 394,360 | 384,940 | 308,696 | 311,017 | 347,019 | 399,620 | 417,500 | 477,919 |
| OTHER HHS ..... | 43,742 | 66,189 | 53,084 | 49,960 | 26,465 | 20,667 | 17,651 | 23,082 | 50,546 | 43,305 |
| DEPT OF THE INTERIOR . | 75,482 | 66,310 | 56,812 | 57,268 | 29,614 | 24,765 | 30,653 | 22,433 | 17,307 | 19,850 |
| DEPT OF TRANSPORTATION | 341,750 | 303,106 | 278,785 | 326,950 | 243,398 | 275,132 | 370,643 | 357,633 | 317,251 | 234,419 |
| OTHER AGENCIES | | | | | | | | | | |
| ENVIRON'L PROTECTION AGENCY ..... | 131,966 | 151,100 | 99,900 | 107,400 | 91,710 | 66,112 | 89,211 | 105,785 | 99,538 | 119,511 |
| NATIONAL AERONAUTICS & SPACE ADMIN ..... | 1,988,093 | 2,117,168 | 1,624,444 | 2,185,997 | 1,670,719 | 1,116,759 | 1,112,700 | 1,543,600 | 1,350,800 | 1,705,200 |
| NAT'L SCI FOUNDATION . | 5,273 | 7,900 | 8,105 | 6,100 | 2,752 | - | - | - | - | - |
| NUCLEAR REGULATORY COMMISSION ..... | - | - | - | - | - | - | - | - | - | - |
| SMITHSONIAN INST ..... | - | - | - | - | - | - | - | - | - | - |
| VETERANS ADMIN ..... | 14,591 | 15,642 | 15,500 | 16,700 | 14,300 | 15,300 | 18,400 | 17,500 | 16,300 | 20,400 |
| ALL OTHER ..... | 224,835 | 256,751 | 336,395 | 180,862 | 192,969 | 166,753 | 159,177 | 168,719 | 164,966 | 191,250 |

1/ DEPARTMENT OF EDUCATION DATA SHOWN FOR 1978 ARE COMPOSED OF DATA FOR THE OFFICE OF EDUCATION, THE NATIONAL INSTITUTE OF EDUCATION, AND THE ASSISTANT SECRETARY FOR EDUCATION OF THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE (HEW).

2/ THE DEPARTMENT OF HEALTH AND HUMAN SERVICES WAS ESTABLISHED IN FY 1979. DATA SHOWN FOR PRIOR YEARS ARE HEW AMOUNTS MINUS EDUCATION PROGRAMS.

SOURCE: NATIONAL SCIENCE FOUNDATION, SRS

## Table B-25. Funds for industrial R&D performance by industry: 1974–85
## [Dollars in millions]

| Industry and size of company | SIC code | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | | $22,887 | $24,187 | $26,997 | $29,825 | $33,304 | $38,226 | $44,505 | $51,810 | $57,996 | $63,403 | $71,470 | $78,208 |
| **Distribution by industry** | | | | | | | | | | | | | |
| Food and kindred products | 20 | 298 | 335 | 355 | 415 | 472 | 52[illegible] | 620 | (1) | (1) | (1) | (1) | (1) |
| Textiles and apparel | 22,23 | 69 | 70 | 82 | 83 | 89 | 101 | 115 | (1) | (1) | (1) | (1) | (1) |
| Lumber, wood products, and furniture | 24,25 | 84 | 88 | 107 | 123 | 126 | 139 | 148 | 161 | 162 | 169 | 181 | 172 |
| Paper and allied products | 26 | 237 | 249 | 313 | 333 | 387 | 445 | 495 | (1) | 626 | (1) | (1) | (1) |
| Chemicals and allied products | 28 | 2,450 | 2,727 | 3,017 | 3,202 | 3,560 | 4,038 | 4,636 | 5,625 | 6,659 | 7,293 | 8,028 | 8,667 |
| Industrial chemicals | 281-82,286 | 1,299 | 1,391 | 1,524 | 1,668 | 1,798 | 1,962 | 2,197 | 2,802 | 3,301 | 3,411 | 3,512 | 3,915 |
| Drugs and medicines | 283 | 807 | 981 | 1,091 | 1,117 | 1,308 | 1,517 | 1,777 | (1) | (1) | (1) | (1) | 3,548 |
| Other chemicals | 284-85,287-89 | 344 | 354 | 401 | 417 | 474 | 559 | 662 | (1) | (1) | (1) | (1) | 1,204 |
| Petroleum refining and related industries | 29 | 622 | 693 | 767 | 918 | 1,060 | 1,262 | 1,552 | (1) | (1) | (1) | (1) | (1) |
| Rubber products | 30 | 469 | 467 | 502 | 491 | 493 | 577 | 656 | (1) | (1) | (1) | (1) | 1,147 |
| Stone, clay, and glass products | 32 | 217 | 273 | 263 | 287 | 324 | 356 | 406 | (1) | (1) | (1) | (1) | (1) |
| Primary metals | 33 | 358 | 443 | 506 | 538 | 560 | 634 | 728 | 878 | 1,000 | 1,115 | (1) | (1) |
| Ferrous metals and products | 331-32,3398-99 | 181 | 215 | 256 | 284 | 314 | 375 | 443 | [illegible] | (1) | (1) | (1) | (1) |
| Nonferrous metals and products | 333-36 | 177 | 228 | 250 | 254 | 246 | 259 | 285 | | (1) | (1) | 357 | 428 |
| Fabricated metal products | 34 | 313 | 324 | 358 | 386 | 384 | 455 | 550 | 624 | 568 | 604 | 716 | 624 |
| Machinery | 35 | 2,985 | 3,196 | 3,487 | 3,880 | 4,283 | 4,825 | 5,901 | 6,818 | 7,835 | 8,386 | 9,667 | 10,870 |
| Office, computing, and accounting machines | 357 | 2,103 | 2,220 | 2,402 | 2,655 | 2,883 | 3,214 | 3,962 | (1) | (1) | (1) | (1) | (1) |
| Other machinery, except electrical | 351-56,358-59 | (2) | (2) | (2) | 1,225 | 1,400 | 1,611 | 1,939 | (1) | (1) | (1 | (1) | (1) |
| Electrical equipment | 36 | 5,011 | 5,105 | 5,636 | 5,886 | 6,507 | 7,824 | 9,175 | 10,329 | 11,642 | 13,950 | 15,994 | 17,080 |
| Radio and TV receiving equipment | 365 | 51 | 50 | 52 | 96 | 130 | 245 | 556 | (1) | (1) | (1) | (1) | (1) |
| Communication equipment | 366 | 2,424 | 2,385 | 2,511 | 2,725 | 2,999 | 3,635 | 4,024 | 4,758 | 5,750 | 7,112 | 8,319 | 9,019 |
| Electronic components | 367 | 489 | 549 | 691 | 770 | 902 | 1,169 | 1,547 | 1,573 | 1,661 | 1,954 | 2,441 | 2,779 |
| Other electrical equipment | 361-64,369 | 2,047 | 2,121 | 2,382 | 2,295 | 2,476 | 2,775 | 3,048 | (1) | (1) | (1) | (1) | (1) |
| Motor vehicles and motor vehicles equipment | 371 | 2,389 | 2,340 | 2,778 | 3,358 | 3,879 | 4,509 | 4,955 | 4,806 | 4,807 | 5,337 | 6,090 | 7,058 |
| Other transportation equipment | 373-75,379 | 87 | 90 | 94 | 120 | 131 | 159 | 162 | (1) | [illegible] | (1) | (1) | (1) |
| Aircraft and missiles | 372,376 | 5,278 | 5,713 | 6,339 | 7,033 | 7,536 | 8,041 | 9,198 | 11,968 | 13,658 | 13,853 | 16,033 | 17,619 |
| Professional and scientific instruments | 38 | 1,075 | 1,173 | 1,331 | 1,571 | 1,993 | 2,505 | 3,029 | 3,614 | 4,0 9 | 4,444 | 4,840 | 5,430 |
| Scientific and mechanical measuring instruments | 381-82 | 221 | 266 | 325 | 452 | 670 | 950 | 1,352 | (1) | (1) | (1) | (1) | (1) |
| Optical, surgical, photographic and other instruments | 383-87 | 854 | 907 | 1,007 | 1,119 | 1,328 | 1,555 | 1,677 | (1) | (1) | (1) | (1) | (1) |
| Other manufacturing industries | 21,27,31,39 | 177 | 205 | 217 | 243 | 266 | 288 | 364 | (1) | (1) | (1) | (1) | (1) |
| Nonmanufacturing industries | 07-17,41-67,737 739,807,891 | 766 | 735 | 845 | 958 | 1,229 | 1,540 | 1,815 | 1,906 | 2,005 | 2,189 | 2,585 | 2,851 |

[1]Not separately available but included in total
[2]Data not tabulated at this level prior to 1977
SOURCE: National Science Foundation, SRS

## Table B-26. Federal funds for industrial R&D performance by industry: 1974–85
[Dollars in millions]

| Industry and size of company | SIC code | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | | $8,220 | $8,605 | $9,561 | $10,485 | $11,189 | $12,518 | $14,029 | $16,382 | $18,483 | $20,542 | $23,162 | $26,484 |
| **Distribution by industry** | | | | | | | | | | | | | |
| Food and kindred products | 20 | 1 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) |
| Textiles and apparel | 22,23 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) |
| Lumber, wood products, and furniture | 24,25 | (1) | 0 | 0 | 0 | 0 | 0 | (1) | 0 | 0 | 0 | 0 | 0 |
| Paper and allied products | 26 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 0 | (1) | (1) | (1) |
| Chemicals and allied products | 28 | 214 | 236 | 266 | 295 | 330 | 346 | 372 | 421 | 434 | 448 | 232 | 315 |
| Industrial chemicals | 281-82,286 | 194 | 218 | 249 | 281 | 325 | 345 | 341 | 409 | 423 | 440 | 223 | 298 |
| Drugs and medicines | 283 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 3 |
| Other chemicals | 284-85,287-89 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 15 |
| Petroleum refining and related industries | 29 | 20 | (1) | 52 | 76 | 121 | 153 | 151 | (1) | (1) | (1) | (1) | (1) |
| Rubber products | 30 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 313 |
| Stone, clay, and glass products | 32 | 14 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) |
| Primary metals | 33 | 8 | 21 | 26 | 44 | 63 | 95 | 135 | 176 | 279 | 392 | (1) | (1) |
| Ferrous metals and products | 331-32,3398-99 | (1) | 3 | 4 | 23 | 43 | 70 | 105 | (1) | (1) | (1) | (1) | (1) |
| Nonferrous metals and products | 333-36 | (1) | 17 | 22 | 21 | 20 | 25 | 30 | (1) | (1) | (1) | 32 | 41 |
| Fabricated metal products | 34 | 14 | 27 | 36 | 44 | 36 | 41 | 49 | 60 | 58 | 62 | 61 | 42 |
| Machinery | 35 | 511 | 509 | 532 | 477 | 382 | 335 | 647 | 694 | 857 | 1,131 | 1,216 | 1,536 |
| Office, computing, and accounting machines | 357 | (2) | 486 | 509 | 435 | 327 | 256 | (1) | (1) | (1) | (1) | (1) | (1) |
| Other machinery, except electrical | 351-56,358-59 | (2) | (2) | (2) | 42 | 55 | 79 | (1) | (1) | (1) | (1) | (1) | ( ) |
| Electrical equipment | 36 | 2,307 | 2,307 | 2,555 | 2,64[illegible] | 2,766 | 3,309 | 3,744 | 3,920 | 4,593 | 5,286 | 5,956 | 6,887 |
| Radio and TV receiving equipment | 365 | (1) | (1) | 0 | 11 | 28 | 53 | 210 | (1) | (1) | (1) | (1) | (1) |
| Communication equipment | 366 | 1,137 | 1,057 | 1,093 | 1,166 | 1,236 | 1,586 | 1,65/ | 1,783 | 2,182 | 2,572 | 3,114 | 3,606 |
| Electronic components | 367 | 184 | (1) | (1) | (1) | (1) | (1) | 382 | 361 | 391 | 346 | 452 | 520 |
| Other electrical equipment | 361-64,369 | (1) | (1) | (1) | (1) | (1) | (1) | 1,495 | (1) | (1) | (1) | (1) | (1) |
| Motor vehicles and motor vehicles equipment | 371 | 288 | 318 | 383 | 471 | 498 | 729 | 655 | 587 | 477 | 566 | 677 | 978 |
| Other transportation equipment | 373-75,379 | 47 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) |
| Aircraft and missiles | 372,376 | 4,000 | 4,428 | 4,921 | 5,486 | 5,713 | 5,840 | 6,628 | 8,528 | 9,776 | 10,405 | 12,228 | 13,421 |
| Professional and scientific instruments | 38 | 187 | 172 | 163 | 221 | 330 | 493 | 573 | 637 | 623 | 639 | 660 | 707 |
| Scientific and mechanical measuring instruments | 381-82 | 10 | 15 | 15 | 47 | 110 | 203 | 350 | (1) | (1) | (1) | (1) | (1) |
| Optical, surgical, photographic and other instruments | 383-87 | 157 | 157 | 148 | 174 | 220 | 290 | 223 | (1) | (1) | (1) | (1) | (1) |
| Other manufacturing industries | 21,27,31,39 | (1) | 7 | 5 | 39 | 0 | 0 | 25 | (1) | (1) | (1) | (1) | (1) |
| Nonmanufacturing industries | 07-17,41-67,737 739,807,891 | 463 | 310 | 375 | 417 | 527 | 881 | 779 | 858 | 904 | 1,022 | 1,215 | 1,485 |

[1]Not separately available but included in total
[2]Data not tabulated at this level prior to 1977
SOURCE: National Science Foundation, SRS

## Table B-27. Company funds for industrial R&D performance by industry: 1974–85
## [Dollars in millions]

| Industry and size of company | SIC code | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | | $14,667 | $15,582 | $17,436 | $19,340 | $22,115 | $25,708 | $30,476 | $35,428 | $39,512 | $42,86. | $48,308 | $51,724 |
| **Distribution by industry** | | | | | | | | | | | | | |
| Food and kindred products | 20 | 297 | (1) | (1) | (1) | (1) | (1) | (1) | 636 | 762 | 766 | 1,001[3] | 1,042[3] |
| Textiles and apparel | 22,23 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 116 | 124 | 125 | 139 | 150 |
| Lumber, wood products, and furniture | 24,25 | (1) | 88 | 106 | 123 | 126 | 139 | 148 | 161 | 162 | 169 | 181 | 172 |
| Paper and allied products | 26 | (1) | (1) | (1) | (1) | (1) | (1) | 495 | 566 | 626 | 674 | 802 | 859 |
| Chemicals and allied products | 28 | 2,236 | 2,490 | 2,751 | 2,907 | 3,250 | 3,692 | 4,264 | 5,205 | 6,226 | 6,845 | 7,797 | 8,352 |
| Industrial chemicals | 281-82,286 | 1,105 | 1,173 | 1,275 | 1,367 | 1,473 | 1,617 | 1,856 | 2,393 | 2,879 | 2,970 | 3,289 | 3,818 |
| Drugs and medicines | 283 | (1) | (1) | (1) | (1) | (1) | (1) | 1,756 | 2,064 | 2,490 | 2,937 | 3,381 | 3,545 |
| Other chemicals | 284-85,287-89 | (1) | (1) | (1) | (1) | (1) | (1) | 653 | 747 | 856 | 938 | 1,126 | 1,189 |
| Petroleum refining and related industries | 29 | 603 | (1) | 715 | 842 | 939 | 1,109 | 1,401 | 1,780 | 1,981 | 2,030 | 2,177 | 2,106 |
| Rubber products | 30 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 598 | 665 | 743 | 884 | 914 |
| Stone, clay, and glass products | 32 | 203 | (1) | (1) | (1) | (1) | (1) | 363 | 411 | 414 | [illegible] | 476 | [illegible] |
| Primary metals | 33 | 350 | 422 | 481 | 494 | 497 | 539 | 594 | 702 | 721 | 722 | 715 | 758 |
| Ferrous metals and products | 331-32,3398-99 | (1) | 211 | 252 | 261 | 271 | 305 | 338 | 415 | 436 | 419 | 389 | 371 |
| Nonferrous metals and products | 333-36 | (1) | 211 | 229 | 233 | 227 | 234 | 256 | 287 | 285 | 303 | 326 | 387 |
| Fabricated metal products | 34 | 299 | 297 | 322 | 342 | 348 | 414 | 501 | 545 | 510 | 542 | 654 | 562 |
| Machinery | 35 | 2,473 | 2,687 | 2,955 | 3,403 | 3,901 | 4,490 | 5,254 | 6,124 | 6,977 | 7,254 | 8,452 | 9,334 |
| Office, computing, and accounting machines | 357 | (1) | 1,734 | 1,893 | 2,220 | 2,556 | 2,958 | 3,436 | 3,847 | 4,722 | 5,182 | 6,171 | 7,122 |
| Other machinery, except electrical | 251-56,358-59 | (2) | (2) | (2) | 1,183 | 1,345 | 1,532 | 1,818 | 2,277 | 2,255 | 2,072 | 2,281 | 2,212 |
| Electrical equipment | 36 | 2,704 | 2,798 | 3,081 | 3,238 | 3,741 | 4,515 | 5,4[illegible] | 6,409 | 7,048 | 6,664 | 9,736 | 10,194 |
| Radio and TV receiving equipment | 365 | (1) | (1) | 52 | 85 | 102 | 192 | 346 | 358 | 398 | 388 | 474 | 501 |
| Communication equipment | 366 | 1,287 | 1,328 | 1,418 | 1,559 | 1,763 | 2,049 | 2,367 | 2,975 | 3,568 | 4,540 | 5,205 | 5,413 |
| Electronic components | 367 | 306 | (1) | (1) | (1) | (1) | (1) | 1,165 | 1,212 | 1,269 | 1,618 | 1,989 | 2,259 |
| Other electrical equipment | 361-64,369 | (1) | (1) | (1) | (1) | (1) | (1) | 1,553 | 1,864 | 1,813 | 2,118 | 2,070 | 2,020 |
| Motor vehicles and motor vehicles equipment | 371 | 2,101 | 2,022 | 2,395 | 2,887 | 3,381 | 3,780 | 4,300 | 4,219 | 4,329 | 4,771 | 5,413 | 6,080 |
| Other transportation equipment | 373-75,379 | 40 | 43 | (1) | (1) | (1) | (1) | 88 | 80 | 96 | 160 | 152 | 138 |
| Aircraft and missiles | 372,376 | 1,279 | 1,285 | 1,418 | 1,547 | 1,823 | 2,201 | 2,570 | 3,440 | 3,882 | 3 448 | 3,804 | 4,196 |
| Professional and scientific instruments | 38 | 908 | 1,001 | 1,166 | 1,350 | 1,668 | 2,012 | 2,456 | 2,978 | 3,396 | 3,805 | 4,180 | 4,724 |
| Scientific and mechanical measuring instruments | 381-82 | 211 | 251 | 309 | 405 | 560 | 747 | 1,001 | 1,235 | 1,433 | 1,773 | 1,941 | 2,159 |
| Optical, surgical, photographic and other instruments | 383-87 | 697 | 750 | 859 | 945 | 1,108 | 1,265 | 1,454 | 1,743 | 1,963 | 2,032 | 2,239 | 2,564 |
| Other manufacturing industries | 21,27,31,39 | (1) | 198 | 212 | 204 | 266 | 288 | 339 | 411 | 493 | 525 | 373 | 350 |
| Nonmanufacturing industries | 07-17,41-67,737, 739,807,891 | 305 | 425 | 471 | 541 | 702 | 859 | 1,037 | 1,048 | 1,101 | 1,167 | 1,370 | 1,366 |

[1]Not separately available but included in total
[2]Data not tabulated at this level prior to 1977
[3]Includes "tobacco products," SIC 21
SOURCE: National Science Foundation, SRS

## Table B-28. R&D funds as a percent of net sales in R&D-performing manufacturing companies by industry: 1974–85

| Industry and size of company | SIC code | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | | 3.1% | 3.1% | 3.1% | 2.9% | 2.9% | 2.6% | 3.0% | 3.1% | 3.8% | 3.9% | 3.8% | 4.2% |
| **Distribution by industry** | | | | | | | | | | | | | |
| Food and kindred products | 20 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | (1) | (1) | (1) | (1) | (1) |
| Textiles and apparel | 22,23 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | (1) | (1) | (1) | (1) | (1) |
| Lumber, wood products, and furniture | 24,25 | 8 | 7 | 7 | 8 | 7 | 7 | 8 | 8 | 9 | 8 | 7 | 6 |
| Paper and allied products | 26 | 8 | 9 | 10 | 9 | 9 | 10 | 10 | (1) | 12 | (1) | (1) | (1) |
| Chemicals and allied products | 28 | 3.5 | 3.7 | 3.7 | 3.6 | 3.6 | 3.5 | 3.6 | 3.6 | 4.3 | 4.4 | 4.6 | 4.8 |
| Industrial chemicals | 281-82,286 | 3.3 | 3.6 | 3.7 | 3.5 | 3.5 | 3.2 | 3.3 | 3.2 | 4.0 | 3.9 | 3.9 | 4.3 |
| Drugs and medicines | 283 | 6.3 | 3.4 | 6.3 | 6.4 | 6.2 | 6.1 | 6.2 | (1) | (1) | (1) | (1) | 8.4 |
| Other chemicals | 284-85,287-89 | 1.6 | 1.7 | 1.7 | 1.8 | 1.8 | 1.8 | 1.9 | (1) | (1) | (1) | (1) | 2.6 |
| Petroleum refining and related products | 29 | 6 | 7 | 6 | 7 | 7 | 7 | 6 | (1) | (1) | (1) | (1) | (1) |
| Rubber products | 30 | 2.5 | 2.5 | 2.4 | 2.1 | 1.9 | 1.9 | 2.2 | (1) | (1) | (1) | (1) | 3.0 |
| Stone, clay, and glass products | 32 | 1.7 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.4 | (1) | (1) | (1) | (1) | (1) |
| Primary metals | 33 | 6 | 8 | .8 | 7 | 7 | 6 | 7 | 9 | 11 | 13 | (1) | (1) |
| Ferrous metals and products | 331-32,3398-99 | 5 | .6 | 6 | 6 | 6 | 6 | 7 | (1) | (1) | (1) | (1) | (1) |
| Nonferrous metals and products | 333-36 | 1.0 | 1.2 | 1.2 | 1.0 | 8 | 7 | 7 | (1) | (1) | (1) | 1.2 | 1.6 |
| Fabricated metal products | 34 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.4 | 1.4 | 1.3 | 1.5 | 1.5 | 1.4 |
| Machinery | 35 | 4.6 | 4.8 | 4.9 | 4.9 | 4.6 | 4.5 | 5.0 | 4.9 | 5.5 | 5.9 | 6.0 | 6.8 |
| Office, computing, and accounting machines | 357 | 12.6 | 12.0 | 11.6 | 11.5 | 11.1 | 11.0 | 12.0 | (1) | (1) | (1) | (1) | (1) |
| Other machinery, except electrical | 351-56,358-59 | (2) | (2) | (2) | 2.2 | 2.1 | 2.1 | 2.3 | (1) | (1) | (1) | (1) | (1) |
| Electrical equipment | 36 | 6.6 | 6.5 | 6.7 | 6.9 | 5.8 | 6.0 | 6.6 | 6.8 | 7.7 | 8.6 | 7.5 | 8.0 |
| Radio and TV receiving equipment | 365 | 1.7 | 1.4 | 1.4 | 1.8 | 1.8 | 2.5 | 4.3 | (1) | (1) | (1) | (1) | (1) |
| Communication equipment | 366 | 7.6 | 7.6 | 7.6 | 7.7 | 7.7 | 8.8 | 9.1 | 9.6 | 11.5 | 12.5 | 9.3 | 9.6 |
| Electronic components | 367 | 6.2 | 6.9 | 7.3 | 6.8 | 6.7 | 7.1 | 7.9 | 7.4 | 6.7 | 7.6 | 7.5 | 9.1 |
| Other electrical equipment | 361-64,369 | 6.3 | 6.0 | 6.3 | 5.2 | 5.1 | 4.9 | 4.9 | (1) | (1) | (1) | (1) | (1) |
| Motor vehicles and motor vehicles equipment | 371 | 3.7 | 3.5 | 3.2 | 3.1 | 3.3 | 3.8 | 4.9 | 4.5 | 4.6 | 4.1 | 3.5 | 3.7 |
| Other transportation equipment | 373-75,379 | 1.3 | 1.3 | 1.3 | 1.2 | .8 | 8 | 6 | (1) | (1) | (1) | (1) | (1) |
| Aircraft and missiles | 372,376 | 14.1 | 12.7 | 12.7 | 13.3 | 13.3 | 12.9 | 13.7 | 16.0 | 17.7 | 16.2 | 16.9 | 17.5 |
| Professional and scientific instruments | 38 | 6.1 | 5.9 | 6.2 | 6.3 | 6.9 | 7.3 | 7.5 | 8.1 | 8.9 | 9.4 | 9.2 | 10.3 |
| Scientific and mechanical measuring instruments | 381-82 | 4.5 | 4.9 | 5.4 | 6.3 | 7.1 | 7.3 | 8.4 | (1) | (1) | (1) | (1) | (1) |
| Optical, surgical, photographic and other instruments | 383-87 | 6.7 | 6.3 | 6.4 | 6.4 | 6.8 | 7.2 | 6.9 | (1) | (1) | (1) | (1) | (1) |
| Other manufacturing industries | 21,27,31,39 | 9 | 8 | 7 | 6 | 5 | 4 | 4 | (1) | ) | (1) | (1) | (1) |

[1]Not separately available but included in total
[2]Data not tabulated at this level prior to 1977
SOURCE National Science Foundation, SRS

## Table B-29. Company R&D funds as a percent of net sales in R&D performing manufacturing companies by industry: 1974–85

| Industry and size of company | SIC code | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 1.9% | 2.1% | 2.2% | 2.6% | 2.6% | 2.6% | 2.8% |
| **Distribution by industry** | | | | | | | | | | | | | |
| Food and kindred products | 20 | 4 | (1) | (1) | (1) | (1) | (1) | (1) | 4 | 4 | 4 | 4 | 4 |
| Textiles and apparel | 22,23 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 4 | 5 | 4 | 4 | 5 |
| Lumber, wood products, and furniture | 24,25 | (1) | 7 | 7 | 8 | 7 | 7 | 8 | 8 | 9 | 8 | 7 | 6 |
| Paper and allied products | 26 | (1) | (1) | (1) | (1) | (1) | (1) | 10 | 10 | 12 | 11 | 12 | 13 |
| Chemicals and allied products | 28 | 3.0 | 3.1 | 3.3 | 3.3 | 3.2 | 3.2 | 3.3 | 3.4 | 4.0 | 4.1 | 4.5 | 4.7 |
| Industrial chemicals | 281-82,286 | 2.8 | 3.1 | 3.1 | 3.0 | 2.9 | 2.6 | 2.8 | 2.8 | 3.5 | 3.4 | 3.7 | 4.0 |
| Drugs and medicines | 283 | (1) | (1) | (1) | (1) | (1) | (1) | 6.1 | 6.3 | 7.1 | 7.8 | 8.4 | 8.4 |
| Other chemicals | 284-85,287-89 | (1) | (1) | (1) | (1) | (1) | (1) | 1.9 | 2.1 | 2.2 | 2.3 | 2.5 | 2.5 |
| Petroleum refining and related products | 29 | 5 | (1) | 6 | 6 | 7 | 6 | 5 | 6 | 8 | 7 | 7 | 7 |
| Rubber products | 30 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 1.9 | 2.2 | 2.2 | 2.2 | 2.2 |
| Stone, clay, and glass products | 32 | 1.5 | (1) | (1) | (1) | (1) | (1) | 1.3 | 1.4 | 1.5 | 1.5 | 1.3 | 1.3 |
| Primary metals | 33 | 5 | 7 | 8 | 7 | 6 | 5 | 5 | 7 | 8 | 8 | 7 | 7 |
| Ferrous metals and products | 331-32,3398-99 | (1) | 6 | 6 | 6 | 5 | 5 | 5 | 6 | 7 | 7 | 6 | .5 |
| Nonferrous metals and products | 333-36 | (1) | 1.1 | 1.1 | 9 | 8 | 6 | 6 | 1.0 | 1.2 | 1.1 | 1.1 | 1.4 |
| Fabricated metal products | 34 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.2 | 1.2 | 1.2 | 1.3 | 1.4 | 1.3 |
| Machinery | 35 | 3.8 | 4.0 | 4.2 | 4.3 | 4.2 | 4.2 | 4.5 | 4.4 | 4.9 | 5.1 | 5.2 | 5.8 |
| Office, computing, and accounting machines | 357 | (1) | 9.4 | 9.1 | 9.6 | 9.8 | 10.1 | 10.4 | 9.7 | 10.3 | 10.0 | 10.4 | 11.8 |
| Other machinery, except electrical | 351-56,358-59 | (2) | (2) | (2) | 2.1 | 2.0 | 2.0 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 |
| Electrical equipment | 36 | 3.5 | 3.6 | 3.7 | 3.4 | 3.4 | 3.6 | 3.9 | 4.2 | 4.7 | 5.3 | 4.6 | 4.8 |
| Radio and TV receiving equipment | 365 | (1) | 1.4 | 1.4 | 1.6 | 1.4 | 1.7 | 2.7 | 2.6 | 2.9 | 2.3 | 2.6 | 2.7 |
| Communication equipment | 366 | 3.9 | 4.2 | 4.3 | 4.4 | 4.5 | 5.0 | 5.4 | 6.0 | 7.1 | 8.0 | 5.8 | 5.7 |
| Electronic components | 367 | 3.9 | (1) | (1) | (1) | (1) | (1) | 5.9 | 5.7 | 5.1 | 6.3 | 6.1 | 7.4 |
| Other electric equipment | 361-64,369 | (1) | (1) | (1) | (1) | (1) | (1) | 2.5 | 2.8 | 2.9 | 3.3 | 3.0 | 2.8 |
| Motor vehicles and motor vehicles equipment | 371 | 3.2 | 3.0 | 2.7 | 2.7 | 2.9 | 3.2 | 4.2 | 3.9 | 4.1 | 3.6 | 3.1 | 3.2 |
| Other transportation equipment | 373-75,379 | 6 | 6 | 6 | 7 | (1) | (1) | 3 | 3 | 6 | 1.3 | 1.3 | 1.2 |
| Aircraft and missiles | 372,376 | 3.5 | 2.8 | 2.8 | 2.9 | 3.2 | 3.5 | 3.8 | 4.6 | 5.0 | 4.0 | 4.0 | 4.1 |
| Professional and scientific instruments | 38 | 5.2 | 5.1 | 5.4 | 5.4 | 5.7 | 5.8 | 6.1 | 6.7 | 7.5 | 8.0 | 7.9 | 9.0 |
| Scientific and mechanical measuring instruments | 381-82 | 4.4 | 4.7 | 5.3 | 5.7 | 5.9 | 5.8 | 6.2 | 6.9 | 7.7 | 9.0 | 8.5 | 9.4 |
| Optical, surgical, photographic and other instruments | 383-87 | 5.5 | 5.2 | 5.5 | 5.4 | 5.6 | 5.9 | 6.0 | 6.6 | 7.3 | 7.3 | 7.5 | 8.6 |
| Other manufacturing industries | 21,27,31,39 | (1) | 7 | 7 | 6 | 5 | 4 | 4 | 4 | 8 | 9 | 9 | 9 |

[1]Not separately available but included in total
[2]Data not tabulated at this level prior to 1977
SOURCE: National Science Foundation, SRS

## Table B-30. Funds for the performance of industrial basic research by industry: selected years
## [Dollars in millions]

| Industry and size of company | SIC code | 1974 | 1975 | 1976 | 1977 | 1979 | 1981 | 1983 | 1984 | 1985 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total | | $699 | $730 | $819 | $911 | $1,158 | $1,614 | $2,152 | $2,475 | $2,628 |
| **Distribution by industry** | | | | | | | | | | |
| Food and kindred products | 20 | 9 | 10 | 18 | 20 | 17 | 27 | 34 | 58[1] | 64[1] |
| Paper and allied products | 26 | 7 | 5 | 6 | 9 | 18 | 32 | (2) | 61 | 70 |
| Chemicals and allied products | 28 | 288 | 294 | 304 | 337 | 366 | 539 | (2) | 672 | 706 |
| Rubber products | 30 | 5 | 4 | 7 | 9 | 18 | 23 | (2) | 26 | 20 |
| Primary metals | 33 | 9 | 14 | 16 | 14 | 24 | 46 | 37 | 57 | 67 |
| Fabricated metal products | 34 | 3 | 5 | 2 | 2 | 4 | 8 | 7 | 7 | 7 |
| Machinery | 35 | 28 | 32 | 56 | 57 | 66 | 128 | 121 | 151 | 174 |
| Electrical equipment | 36 | 143 | 132 | 163 | 181 | 228 | 279 | 433 | 471 | 504 |
| Communication equipment | 366 | 116 | 109 | 130 | 150 | 195 | (2) | 305 | 272 | 286 |
| Aircraft and missiles | 372,376 | 57 | 54 | 54 | 55 | 88 | 128 | 146 | 259 | 304 |
| All other industries | | 150 | 180 | 193 | 227 | 329 | 404 | 655 | 713 | 712 |

[1]Includes "tobacco products," SIC 21
[2]Not separately available but included in total
SOURCE: National Science Foundation, SRS

## Table B-31. Funds for the performance of applied research and development by product field: selected years

[Dollars in millions]

| Product field | SIC code | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1979 | 1981 | 1983 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | | $17,465 | $17,730 | $18,959 | $20,618 | $22,188 | $23,457 | $26,178 | $28,914 | $37,068 | $50,196 | $61,232 |
| Food and kindred products | 20 | 206 | 211 | 227 | 243 | 283 | 273 | 308 | 346 | 420 | 492 | 636 |
| Textile mill products | 22 | 55 | 60 | 83 | 93 | 82 | 73 | 81 | 96 | (2) | (2) | (2) |
| Chemicals, except drugs and medicines | 28, except 283 | 1,339 | 1,345 | 1,250 | 1,342 | 1,564 | 1,627 | 1,853 | 2,018 | 2,501 | 3,267 | 4,033 |
| Industrial inorganic and organic chemicals | 281,286 | 442 | 457 | 451 | 489 | 589 | 665 | 728 | 819 | (2) | 1,020 | 1,146 |
| Plastics materials and synthetic resins, rubber, and fibers | 282 | 521 | 511 | 453 | 511 | 589 | 588 | 674 | 744 | 881 | 1,060 | 1,360 |
| Agricultural chemicals | 287 | 126 | 130 | 108 | 114 | 137 | 176 | 205 | 236 | 292 | 487 | 587 |
| Other chemicals | 284-85,289 | 223 | 218 | 238 | 229 | 248 | 198 | 246 | 220 | (2) | 700 | 940 |
| Drugs and medicines | 283 | 474 | 535 | 531 | 605 | 683 | 783 | 883 | 955 | 1,089 | 1,837 | 2,601 |
| Petroleum refining and related industries | 29 | 272 | 266 | 299 | 319 | 363 | 408 | 425 | 471 | 650 | 975 | 929 |
| Rubber and miscellaneous plastics products | 30 | 193 | 215 | 278 | 294 | 341 | 324 | 325 | 376 | 407 | (2) | (2) |
| Stone, clay, and glass products | 32 | 128 | 128 | 135 | 162 | 181 | 150 | 171 | 191 | 235 | 240 | 194 |
| Primary metals | 33 | 235 | 230 | 245 | 272 | 311 | 290 | 311 | 327 | 438 | 564 | 558 |
| Ferrous metals and products | 331-32 3398-99 | 127 | 114 | 137 | 158 | 156 | 144 | 163 | 172 | 225 | 266 | 276 |
| Nonferrous metals and products | 333-36 | 108 | 116 | 108 | 114 | 155 | 147 | 146 | 155 | 213 | 416 | 280 |
| Fabricated metal products | 34, except 348 | 622 | 701 | 731 | 769 | 903 | 918 | 1,025 | 1,152 | 1,361 | 1,518 | 1,379 |
| Ordnance and accessories, n.e.c | 348 | 192 | 192 | 177 | 228 | 222 | 187 | 199 | 288 | 318 | 453 | (2) |
| Machinery | 35 | 1,878 | 1,783 | 1,989 | 2,307 | 2,689 | 2,628 | 3,001 | 3,554 | 4,561 | 8,288 | 7,452 |
| Engines and turbines | 351 | 204 | 246 | 318 | 360 | 482 | 464 | 477 | 528 | 589 | 904 | 1,199 |
| Farm machinery and equipment | 352 | 89 | 90 | 93 | 120 | 13 | 138 | 168 | 221 | 295 | 278 | 290 |
| Construction, mining and materials handling machinery | 353 | 182 | 196 | 206 | 263 | 283 | 285 | 317 | 378 | 632 | 569 | 506 |
| Metalworking machinery and equipment | 354 | 86 | 84 | 78 | 69 | 74 | 80 | 83 | 125 | 340 | 227 | 244 |
| Office, computing, and accounting machines | 357 | 863 | 903 | 1,028 | 1,219 | 1,422 | 1,339 | 1,580 | 1,849 | 1,961 | 3,220 | 4,091 |
| Other machinery, except electrical | 355-56,358-59 | 252 | 264 | 270 | 274 | 297 | 322 | 376 | 455 | 744 | 1,090 | 1,122 |
| Electrical equipment, except radio and TV receiving equipment, communication equipment, and electronic components | 35, except 365-67;3825 | 3,372 | 688 | 775 | 857 | 929 | 774 | 874 | 901 | 980 | 1,724 | 1,874 |
| Electric transmission and distribution equipment | 361,3825 | | 181 | 189 | 204 | 239 | 205 | 224 | 224 | 191 | (2) | (2) |
| Electrical industrial apparatus | 362 | | 187 | 231 | 263 | 264 | 260 | 306 | 298 | 291 | (2) | (2) |
| Other electrical equipment and supplies | 363-64,368-69 | | 320 | 355 | 390 | 426 | 309 | 344 | 379 | 498 | 553 | 1,003 |
| Radio and TV receiving equipment, communication equipment, and electronic components | 365-67 | | 2,927 | 3,234 | 3,641 | 3,896 | 3,911 | 4,483 | 5,019 | 6,896 | (2) | (2) |
| Motor vehicles and other transportation equipment | 37 except 373,378 | 1,138 | 1,341 | 1,668 | 2,014 | 1,994 | 1,924 | 2,263 | (2) | (2) | (2) | (2) |
| Motor vehicles and equipment | 371 | 1,046 | 1,228 | 1,470 | 1,824 | 1,784 | 1,720 | (2) | (2) | (2) | (2) | (2) |
| Other transportation equipment | 373-75,379 | 90 | 113 | 198 | 190 | 210 | 204 | 193 | 201 | 205 | (2) | 377 |
| Aircraft and parts | 372 | 2,556 | 2,486 | 2,396 | 2,548 | 2,420 | 2,265 | 2,733 | 3,113 | 3,460 | 4,924 | 5,877 |
| Guided missiles and spacecraft | 378 | 3,115 | 2,832 | 2,647 | 2,491 | 2,486 | 2,925 | 2,880 | 3,024 | 4,485 | 4,814 | 6,904 |
| Professional and scientific instruments | 38, except 3825 | 724 | 852 | 847 | 981 | 1,090 | 1,002 | 1,140 | 1,255 | 1,434 | 1,486 | 1,812 |
| Other product fields, n.e.c | — | 1,194 | 1,177 | 1,440 | 1,485 | 1,742 | 2,967 | 3,179 | 3,201 | 4,062 | 5,657 | 6,681 |

[1]Data not collected for 1978, 1980, 1982, and 1984

[2]Not separately available but included in total

NOTE: N.E.C.—not elsewhere classified.

SOURCE: National Science Foundation, SRS

## Table B-32. Full-time-equivalent number of R&D scientists and engineers by industry: January 1975–86
### [In thousands]

| Industry and size of company | SIC code | January | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
| Total | | 363.3 | 364.4 | 382.8 | 404.4 | 423.9 | 450.6 | 487.8 | 509.8 | 522.1 | 544.5 | 560.2 | 580.3 |
| **Distribution by industry** | | | | | | | | | | | | | |
| Food and kindred products | 20 | 6.8 | 6.9 | 6.9 | 6.9 | 7.4 | 7.2 | 7.4 | 7.4 | 7.8 | 7.6 | 9.6[3] | 10.0[3] |
| Textiles and apparel | 22,23 | 1.8 | 1.8 | 1.7 | 1.8 | 1.8 | (1) | 2.0 | 1.9 | 2.0 | 2.0 | 2.2 | 1.9 |
| Lumber, wood products, and furniture | 24,25 | 2.3 | 2.1 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | (1) | 1.8 | (1) | (1) | (1) |
| Paper and allied products | 26 | 5.0 | 5.2 | 6.3 | 6.5 | 7.1 | 7.4 | 8.0 | 8.4 | 8.3 | 7.9 | 8.7 | 9.2 |
| Chemicals and allied products | 28 | 45.2 | 44.4 | 46.4 | 48.3 | 50.0 | 51.4 | 54.7 | 61.6 | 66.0 | 67.1 | 67.0 | 71.3 |
| Industrial chemicals | 281-82,286 | 21.1 | 20.1 | 20.6 | 21.3 | 21.4 | 20.9 | 21.6 | 25.9 | 27.2 | 26.7 | 25.0 | 26.8 |
| Drugs and medicines | 283 | 15.6 | 16.6 | 17.8 | 19.5 | 20.8 | 21.6 | 23.3 | 25.6 | 28.2 | (1) | (1) | (1) |
| Other chemicals | 284-84,287-89 | 8.5 | 7.8 | 9.0 | 7.5 | 7.8 | 8.9 | 9.8 | 10.1 | 10.6 | 10.3 | 11.3 | 11.2 |
| Petroleum refining and related industries | 29 | 8.4 | 8.6 | 8.9 | 9.9 | 10.1 | 10.8 | 13.0 | 15.6 | 14.7 | 13.2 | 13.4 | 10.3 |
| Rubber products | 30 | 6.2 | 8.6 | 9.1 | 7.9 | 8.1 | (1) | 10.3 | 8.1 | (1) | (1) | (1) | (1) |
| Stone, clay, and glass products | 32 | 4.5 | 4.6 | 4.5 | 5.1 | 5.2 | 5.4 | 5.6 | 5.1 | 5.0 | 4.6 | 4.9 | 5.2 |
| Primary metals | 33 | 6.3 | 8.1 | 8.4 | 8.1 | 7.9 | 8.1 | 7.9 | 8.4 | 8.4 | 8.5 | 9.5 | 12.1 |
| Ferrous metals and products | 331-32,3398-99 | 3.3 | 3.9 | 3.9 | 4.2 | 4.3 | 4.7 | 4.8 | 5.2 | 5.3 | 5.2 | 6.4 | 6.6 |
| Nonferrous metals and products | 333-36 | 3.0 | 4.2 | 4.5 | 3.9 | 3.6 | 3.4 | 3.1 | 3.2 | 3.1 | 3.3 | 3.1 | 3.5 |
| Fabricated metal products | 34 | 7.4 | 6.8 | 7.1 | 7.0 | 6.8 | 7.8 | 7.8 | 8.2 | (1) | 12.9 | (1) | (1) |
| Machinery | 35 | 52.8 | 55.7 | 55.3 | 57.8 | 60.2 | 62.1 | 69.2 | 76.0 | 76.3 | 75.0 | 77.3 | 82.0 |
| Office, computing, and accounting machines | 357 | 36.1 | 36.1 | 37.7 | 38.9 | 40.9 | 41.8 | 43.7 | 48.1 | 49.8 | 50.3 | 52.0 | 57.2 |
| Other machinery, except electrical | 351-56,358-59 | (2) | (2) | (2) | 18.9 | 19.3 | 20.3 | 25.5 | 27.9 | 26.7 | 24.7 | 25.3 | 24.8 |
| Electrical equipment | 36 | 82.6 | 80.3 | 84.1 | 84.4 | 85.0 | 94.5 | 106.9 | 109.8 | 110.3 | 116.1 | 115.3 | 118.2 |
| Radio and TV receiving equipment | 365 | 1.0 | 1.1 | .9 | 1.5 | 2.1 | 4.0 | 7.9 | 7.8 | (1) | (1) | (1) | (1) |
| Communication equipment | 366 | 40.2 | 37.4 | 38.0 | 39.0 | 40.4 | 42.4 | 44.2 | 45.9 | 47.3 | 56.1 | 56.9 | 59.1 |
| Electronic components | 367 | 10.6 | 10.2 | 13.0 | 14.2 | 14.0 | 18.1 | 22.8 | 24.4 | 24.5 | (1) | (1) | (1) |
| Other electrical equipment | 361-64,369 | 30.8 | 31.6 | 32.2 | 29.7 | 28.5 | 30.0 | 32.0 | 31.7 | (1) | 27.9 | 30.3 | 29.5 |
| Motor vehicles and motor vehicles equipment | 371 | 25.7 | 25.4 | 28.2 | 31.9 | 35.2 | 38.2 | 31.1 | 30.0 | 29.0 | 28.6 | 28.7 | 33.3 |
| Other transportation equipment | 373-75,379 | 1.9 | 1.7 | 1.9 | 1.9 | 2.0 | 1.5 | 1.4 | 1.2 | 1.9 | (1) | (1) | (1) |
| Aircraft and missiles | 372,376 | 67.5 | 66.9 | 72.0 | 82.0 | 86.5 | 85.9 | 95.2 | 91.1 | 95.5 | 96.5 | 103.8 | 106.4 |
| Professional and scientific instruments | 38 | 17.9 | 18.8 | 20.5 | 23.3 | 27.0 | 32.6 | 34.7 | 42.7 | (1) | (1) | 47.5 | 52.3 |
| Scientific and mechanical measuring instruments | 381-82 | 5.9 | 6.7 | 7.2 | 9.0 | 11.7 | (1) | 18.6 | ) | (1) | (1) | (1) | (1) |
| Optical, surgical, photographic, and other instruments | 383-87 | 12.0 | 12.1 | 13.3 | 14.3 | 15.3 | 16.3 | 16.0 | 16.1 | (1) | (1) | (1) | (1) |
| Other manufacturing industries | 21,27,31 | 3.7 | 4.2 | 4.5 | 4.6 | 4.7 | 4.6 | 4.8 | 5.5 | 6.1 | (1) | (1) | (1) |
| Nonmanufacturing industries | 07-17,41-67,73,739,807,891 | 14.9 | 14.6 | 15.3 | 15.0 | 17.1 | 19.8 | 22.2 | [illegible] | 26.2 | 34.9 | 39.3 | 36.4 |

[1]Not separately available but included in total
[2]Data not tabulated at this level prior to the 1977 survey
[3]Includes "tobacco products" SIC 21
SOURCE: National Science Foundation, SRS

TABLE B-33. R&D EXPENDITURES AT UNIVERSITIES AND COLLEGES BY SOURCE OF FUNDS, CHARACTER OF WORK, AND SCIENCE/ENGINEERING FIELD: FISCAL YEARS 1979-86

(DOLLARS IN THOUSANDS)

| SOURCE, CHARACTER, AND FIELD | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|
| TOTAL | 5,361,408 | 6,060,629 | 6,809,552 | 7,266,122 | 7,798,179 | 8,508,380 | 9,524,293 | 10,718,402 |
| SOURCE OF FUNDS: | | | | | | | | |
| FEDERAL GOVERNMENT | 3,395,271 | 4,097,011 | 4,556,889 | 4,746,803 | 4,952,731 | 5,385,678 | 5,997,773 | 6,633,347 |
| STATE AND LOCAL GOVERNMENTS | 470,073 | 491,069 | 544,202 | 609,043 | 624,442 | 682,843 | 729,411 | 902,963 |
| INDUSTRY | 194,186 | 236,937 | 290,741 | 333,455 | 377,930 | 460,641 | 542,849 | 667,362 |
| INSTITUTIONAL FUNDS | 728,298 | 827,116 | 972,435 | 1,077,478 | 1,255,780 | 1,349,812 | 1,556,562 | 1,774,421 |
| ALL OTHER SOURCES | 373,580 | 408,466 | 445,285 | 499,143 | 587,296 | 629,406 | 697,697 | 740,309 |
| CHARACTER OF WORK: | | | | | | | | |
| BASIC RESEARCH | 3,612,278 | 4,026,932 | 4,570,848 | 4,850,858 | 5,264,841 | 5,637,923 | 6,386,656 | 7,243,658 |
| APPLIED RESEARCH AND DEVELOPMENT | 1,749,130 | 2,033,697 | 2,238,704 | 2,415,264 | 2,533,338 | 2,870,457 | 3,137,637 | 3,47[illegible].744 |
| FIELD: | | | | | | | | |
| ENGINEERING, TOTAL 1/ | 768,407 | 864,924 | 960,677 | 1,025,513 | 1,110,811 | [illegible],207,104 | 1,386,717 | 1,609,093 |
| AERONAUTICAL AND ASTRONAUTICAL | - | 46,285 | 45,481 | 60,226 | [illegible]5,009 | 66,344 | 75,716 | 86,519 |
| CHEMICAL | - | 67,557 | 83,207 | 83,548 | 90,767 | 96,199 | 108,927 | 129,122 |
| CIVIL | - | 88,641 | 108,174 | 108,711 | 109,921 | 133,692 | 147,428 | 171,012 |
| ELECTRICAL | - | 184,050 | 193,080 | 223,862 | 259,283 | 291,795 | 336,932 | 398,203 |
| MECHANICAL | - | 146,163 | 149,128 | 142,171 | 149,881 | 176,682 | 205,625 | 224,206 |
| OTHER, N.E.C. | - | 332,228 | 381,607 | 406,995 | 435,950 | 442,391 | 512,088 | 604,031 |
| ALL SCIENCES, TOTAL | 4,593,001 | 5,195,705 | 5,848,875 | 6,240,609 | 6,687,368 | 7,301,276 | 8,137,576 | 9,109,309 |
| PHYSICAL SCIENCES | 601,904 | 677,293 | 764,673 | 822,584 | 897,099 | 991,917 | 1,123,913 | 1,261,376 |
| ASTRONOMY | 48,459 | 58,740 | 67,337 | 73,237 | 74,177 | 80,457 | 91,049 | 96,335 |
| CHEMISTRY | 206,421 | 243,982 | 283,899 | 308,091 | 334,663 | 367,843 | 411,615 | 469,084 |
| PHYSICS | 292,033 | 322,230 | 356,859 | 365,897 | 414,165 | 469,403 | 550,045 | 622,296 |
| OTHER, N.E.C. | 54,991 | 52,341 | 56,578 | 75,359 | [illegible]4,094 | 74,215 | 81,204 | 82,661 |
| ENVIRONMENTAL SCIENCES 1/ | 452,915 | 509,038 | 548,920 | 557,217 | 626,962 | 649,601 | 705,357 | 774,177 |
| ATMOSPHERIC | - | 67,459 | 78,257 | 85,443 | 97,660 | 102,875 | 109,549 | 124,826 |
| EARTH SCIENCES | - | 188,226 | 189,692 | 195,507 | 216,159 | 225,525 | 250,534 | 261,849 |
| OCEANOGRAPHY | - | 171,668 | 187,463 | 197,701 | 223,994 | 238,157 | 260,306 | 275,524 |
| OTHER, N.E.C. | - | 81,685 | 93,508 | 79,166 | 81,149 | 83,044 | 84,968 | 111,978 |
| MATHEMATICAL SCIENCES | 78,477 | 78,667 | 88,793 | 98,568 | 108,038 | 124,398 | 129,799 | 152,204 |
| COMPUTER SCIENCES | 97,921 | 114,196 | 132,884 | 149,259 | 175,236 | 222,480 | 279,181 | 315,360 |
| LIFE SCIENCES | 2,832,523 | 3,217,658 | 3,670,596 | 3,969,593 | 4,233,143 | 4,617,226 | 5,155,422 | 5,746,125 |
| AGRICULTURAL SCIENCES | 602,485 | 679,880 | 772,434 | 844,040 | 895,520 | 930,245 | 1,028,549 | 1,122,363 |
| BIOLOGICAL SCIENCES | 914,806 | 1,030,429 | 1,186,333 | 1,286,548 | 1,408,240 | 1,555,330 | 1,697,690 | 1,832,910 |
| MEDICAL SCIENCES | 1,237,556 | 1,414,345 | 1,599,203 | 1,717,072 | 1,801,576 | 1,989,803 | 2,259,525 | 2,578,240 |
| OTHER, N.E.C. | 77,676 | 93,004 | 112,626 | 121,933 | 127,807 | 141,848 | 169,658 | 212,612 |
| PSYCHOLOGY | 100,531 | 111,290 | 128,328 | 132,322 | 138,505 | 146,884 | 162,047 | 180,453 |
| SOCIAL SCIENCES | 295,138 | 341,445 | 370,351 | 358,286 | 354,348 | 372,337 | 389,790 | 459,303 |
| ECONOMICS | 83,089 | 90,158 | 99,496 | 95,590 | 96,476 | 109,215 | 115,789 | 132,377 |
| POLITICAL SCIENCE | 45,431 | 55,395 | 56,315 | 61,371 | 55,545 | 56,317 | 60,738 | 68,074 |
| SOCIOLOGY | 71,641 | 88,556 | 94,658 | 80,252 | 78,327 | 74,626 | 78,643 | 88,311 |
| OTHER, N.E.C. | 91,977 | 107,336 | 119,882 | 121,073 | 124,000 | 132,178 | 134,620 | 170,542 |
| OTHER SCIENCES, N.E.C. | 133,592 | 146,118 | 144,330 | 152,180 | 162,037 | 176,433 | 182,066 | 220,311 |

1/ DETAIL NOT SEPARATELY AVAILABLE PRIOR TO 1980.

SOURCE: NATIONAL SCIENCE FOUNDATION, SRS

TABLE B-34. FEDERALLY FINANCED R&D EXPENDITURES AT UNIVERSITIES AND COLLEGES BY CHARACTER OF WORK AND SCIENCE/ENGINEERING FIELD: FISCAL YEARS 1979-86

(DOLLARS IN THOUSANDS)

| CHARACTER AND FIELD | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|
| TOTAL | 3,595,271 | 4,097,011 | 4,556,889 | 4,746,803 | 4,952,731 | 5,385,678 | 5,997,773 | 6,633,347 |
| CHARACTER OF WORK: | | | | | | | | |
| BASIC RESEARCH | 2,571,744 | 2,854,095 | 3,246,554 | 3,391,563 | 3,5[illegible],467 | 3,780,209 | 4,251,485 | 4,747,653 |
| APPLIED RESEARCH AND DEVELOPMENT | 1,023,527 | 1,242,916 | 1,310,335 | 1,355,240 | 1,419,264 | 1,605,469 | 1,746,288 | 1,885,694 |
| FIELD: | | | | | | | | |
| ENGINEERING, TOTAL 1/ | 526,364 | 595,446 | 662,283 | 697,943 | 737,084 | 778,118 | 856,402 | 968,474 |
| AERONAUTICAL AND ASTRONAUTICAL | - | 35,616 | 35,262 | 47,889 | 51,902 | 52,18[illegible] | 59,719 | 67,345 |
| CHEMICAL | - | 46,057 | 55,162 | 49,615 | 51,977 | 54,28[illegible] | 57,620 | 56,135 |
| CIVIL | - | 58,920 | 67,906 | 68,996 | 58,060 | 74,791 | 81,202 | 91,517 |
| ELECTRICAL | - | 139,621 | 145,390 | 173,799 | 191,871 | 207,267 | 228,574 | 265,[illegible]95 |
| MECHANICAL | - | 99,774 | 102,976 | 97,606 | 101,276 | 117,734 | 132,106 | 144,529 |
| OTHER, N.E.C. | - | 215,464 | 255,587 | 270,038 | 281,998 | 271,853 | 297,181 | 333,063 |
| ALL SCIENCES, TOTAL | 3,068,907 | 3,501,565 | 3,894,606 | 4,048,860 | 4,215,647 | 4,607,561 | 5,141,370 | 5,664 873 |
| PHYSICAL SCIENCES | 490,680 | 554,819 | 618,053 | 648,917 | 697,447 | 778,610 | 882,504 | 975,516 |
| ASTRONOMY | 36,245 | 44,441 | 47,822 | 51,675 | 50,370 | 53,111 | 60,112 | 64,009 |
| CHEMISTRY | 156,516 | 189,427 | 216,052 | 230,302 | 247,652 | 277,957 | 307,214 | 337,913 |
| PHYSICS | 252,518 | 279,890 | 308,549 | 306,025 | 339,909 | 388,188 | 454,993 | 509,574 |
| OTHER, N.E.C. | 45,401 | 41,061 | 45,624 | 60,915 | 59,516 | 59,353 | 60,186 | 64,021 |
| ENVIRONMENTAL SCIENCES 1/ | 329,154 | 372,533 | 391,727 | 391,159 | 426,847 | 450,967 | 477,550 | 520,137 |
| ATMOSPHERIC | - | 55,524 | 58,690 | 68,297 | 75,943 | 82,107 | 86,431 | 99,485 |
| EARTH SCIENCES | - | 131,272 | 127,927 | 126,996 | 135,808 | 129,410 | 152,825 | 150,942 |
| OCEANOGRAPHY | - | 132,726 | 145,923 | 153,574 | 171,352 | 183,582 | 191,791 | 207,095 |
| OTHER, N.E.C. | - | 53,011 | 59,187 | 42,292 | 43,744 | 45,868 | 46,504 | 62,615 |
| MATHEMATICAL SCIENCES | 60,431 | 61,114 | 67,672 | 71,827 | 76,397 | 91,064 | 95,691 | 112,364 |
| COMPUTER SCIENCES | 69,192 | 76,982 | 93,452 | 106,918 | 127,697 | 161,595 | 193,154 | 227,428 |
| LIFE SCIENCES | 1,818,779 | 2,094,873 | 2,362,586 | 2,492,608 | 2,563,362 | 2,7[illegible],038 | 3,140,747 | 3,4[illegible].947 |
| AGRICULTURAL SCIENCES | 184,676 | 211,897 | 233,656 | 254,756 | 259,663 | 270,074 | 298,377 | [illegible],075 |
| BIOLOGICAL SCIENCES | 664,675 | 763,373 | 865,465 | 920,822 | 983,318 | 1,087,778 | 1,192,986 | 1,[illegible]8,995 |
| MEDICAL SCIENCES | 914,905 | 1,056,561 | 1,187 79 | 1,238,622 | 1,242,736 | 1,349,158 | 1,547,246 | 1,738,302 |
| OTHER, N.E.C. | 54,523 | 63,042 | 76,486 | 78,408 | 77,645 | 89,028 | 102,138 | 124,495 |
| PSYCHOLOGY | 72,257 | 81,193 | 92,457 | 89,086 | 90,599 | 98,379 | 107,480 | 118,449 |
| SOCIAL SCIENCES | 155,074 | 181,627 | 186,978 | 161,795 | 147,573 | 144,892 | 154,647 | 166,948 |
| ECONOMICS | 40,026 | 43,430 | 44,508 | 41,199 | 37,072 | 41,953 | 42,450 | 42,678 |
| POLITICAL SCIENCE | 20,561 | 23,676 | 23,362 | 22,521 | 19,926 | 18,305 | 20,073 | 19,731 |
| SOCIOLOGY | 47,144 | 57,140 | 56,353 | 45,965 | 42,405 | 38,559 | 40,256 | 43,685 |
| OTHER, N.E.C. | 47,343 | 57,381 | 62,755 | 52,110 | 48,170 | 46,075 | 51,867 | 60,655 |
| OTHER SCIENCES, N.E.C. | 73,340 | 78,424 | 81,681 | 86,540 | 85,725 | 86,056 | 89,597 | 104,083 |

1/ DETAIL NOT SEPARATELY AVAILABLE PRIOR TO 1980.

SOURCE: NATIONAL SCIENCE FOUNDATION, SRS

TABLE B-35. CAPITAL EXPENDITURES AT UNIVERSITIES AND COLLEGES BY SCIENCE/ENGINEERING FIELD AND SOURCE OF FUNDS: FISCAL YEARS 1979-86 1/

(DOLLARS IN THOUSANDS)

| FIELD | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|
| TOTAL | 696,218 | 794,512 | 952,672 | 969,147 | 1,098,941 | 1,215,249 | 1,312,657 | 1,578,818 |
| ENGINEERING | 87,128 | 89,297 | 103,329 | 144,457 | 134,980 | 142,894 | 187,320 | 316,440 |
| ALL SCIENCES, TOTAL | 609,090 | 705,215 | 849,343 | 824,690 | 963,961 | 1,072,355 | 1,125,337 | 1,262,378 |
| PHYSICAL SCIENCES | 64,685 | 77,154 | 87,813 | 82,100 | 97,467 | 116,071 | 131,108 | 152,808 |
| ENVIRONMENTAL SCIENCES | 25,153 | 36,208 | 35,025 | 42,365 | 41,112 | 36,814 | 54,053 | 47,111 |
| MATHEMATICAL/COMPUTER SCIENCES | 27,244 | 32,318 | 30,517 | 34,328 | 53,098 | 49,971 | 75,657 | 91,088 |
| LIFE SCIENCES | 428,293 | 459,057 | 597,635 | 590,353 | 678,778 | 741,416 | 751,646 | 839,906 |
| PSYCHOLOGY | 7,060 | 17,982 | 10,991 | 12,798 | 17,012 | 25,205 | 20,900 | 25,472 |
| SOCIAL SCIENCES | 21,358 | 35,073 | 45,138 | 30,797 | 40,870 | 51,933 | 61,849 | 50,711 |
| OTHER SCIENCES, N.E.C. | 35,259 | 47,423 | 42,224 | 31,949 | 35,624 | 40,946 | 30,125 | 55,282 |
| FEDERAL SOURCES, TOTAL | 164,460 | 149,543 | 153,800 | 116,651 | 131,517 | 141,728 | 144,296 | 193,120 |
| ENGINEERING | 20,927 | 20,438 | 17,601 | 18,136 | 16,163 | 24,013 | 16,778 | 23,635 |
| ALL SCIENCES, TOTAL | 143,533 | 129,125 | 136,199 | 98,515 | 115,354 | 117,715 | 127,519 | 159,485 |
| PHYSICAL SCIENCES | 32,186 | 22,463 | 25,529 | 20,154 | 18,579 | 18,916 | 31,300 | 35,089 |
| ENVIRONMENTAL SCIENCES | 8,220 | 8,033 | 6,866 | 4,404 | 3,644 | 3,490 | 3,547 | 6,184 |
| MATHEMATICAL/COMPUTER SCIENCES | 2,983 | 5,653 | 4,944 | 3,798 | 4,458 | 5,296 | 6,718 | 14,048 |
| LIFE SCIENCES | 90,796 | 86,105 | 89,410 | 66,004 | 81,016 | 85,412 | 80,829 | 94,310 |
| PSYCHOLOGY | 1,740 | 2,002 | 1,580 | 1,023 | 1,365 | 1,008 | 820 | 1,266 |
| SOCIAL SCIENCES | 2,076 | 1,528 | 6,376 | 1,374 | 4,959 | 2,932 | 2,096 | 2,505 |
| OTHER SCIENCES, N.E.C. | 5,532 | 3,341 | 1,494 | 1,758 | 1,333 | 660 | 2,209 | 6,082 |
| OTHER SOURCES, TOTAL | 531,758 | 644,949 | 798,872 | 852,496 | 967,424 | 1,073,521 | 1,168,361 | 1,385,698 |
| ENGINEERING | 66,201 | 68,859 | 85,728 | 126,321 | 118,817 | 118,881 | 170,542 | 292,805 |
| ALL SCIENCES, TOTAL | 465,557 | 576,090 | 713,144 | 725,175 | 848,607 | 954,640 | 997,818 | 1,102,893 |
| PHYSICAL SCIENCES | 32,499 | 54,691 | 62,284 | 61,946 | 78,888 | 97,154 | 99,808 | 117,719 |
| ENVIRONMENTAL SCIENCES | 16,933 | 28,175 | 28,159 | 37,961 | 37,468 | 33,324 | 50,506 | 40,527 |
| MATHEMATICAL/COMPUTER SCIENCES | 24,299 | 26,665 | 25,573 | 30,530 | 48,640 | 44,675 | 68,939 | 77,040 |
| LIFE SCIENCES | 337,497 | 372,952 | 508,225 | 524,349 | 597,762 | 656,004 | 670,817 | 745,596 |
| PSYCHOLOGY | 5,320 | 15,980 | 9,411 | 11,775 | 15,647 | 34,197 | 20,080 | 24,206 |
| SOCIAL SCIENCES | 19,282 | 35,545 | 38,762 | 27,423 | 35,911 | 49,001 | 59,753 | 48,206 |
| OTHER SCIENCES, N.E.C. | 29,727 | 44,082 | 40,730 | 30,191 | 34,291 | 40,286 | 27,916 | 49,200 |

1/ INCLUDES EXPENDITURES FOR FACILITIES AND EQUIPMENT FOR RESEARCH, DEVELOPMENT, AND INSTRUCTION.

SOURCE: NATIONAL SCIENCE FOUNDATION, SRS

TABLE B-36 R&D EXPENDITURES AT UNIVERSITY-ADMINISTERED FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS BY CHARACTER OF WORK AND SCIENCE/ENGINEERING FIELD: FISCAL YEARS 1979-86

(DOLLARS IN THOUSANDS)

| CHARACTER AND FIELD | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|
| TOTAL | 1,934,797 | 2,245,773 | 2,485,853 | 2,478,721 | 2,736,652 | 3,117,716 | 3,529,109 | 3,900,070 |
| CHARACTER OF WORK: | | | | | | | | |
| BASIC RESEARCH | 718,303 | 785,774 | 863,179 | 869,701 | 982,272 | 1,052,027 | 1,078,224 | 1,120,528 |
| APPLIED RESEARCH AND DEVELOPMENT | 1,216,494 | 1,459,999 | 1,622,674 | 1,609,020 | 1,754,380 | 2,065,689 | 2,450,885 | 2,779,542 |
| FIELD: | | | | | | | | |
| ENGINEERING, TOTAL 1/ | 561,083 | 644,910 | 656,426 | 636,158 | 944,952 | 1,109,866 | 1,312,412 | 1,461,621 |
| AERONAUTICAL AND ASTRONAUTICAL | - | 24,778 | 60,339 | 59,409 | 69,057 | 86,022 | 107,065 | 126,566 |
| CHEMICAL | - | 38,406 | 47,454 | 44,988 | 45,832 | 46,718 | 49,928 | 49,894 |
| CIVIL | - | 18,874 | 16,052 | 17,952 | 12,378 | 13,596 | 15,597 | 16,014 |
| ELECTRICAL | - | 200,981 | 169,059 | 171,470 | 316,652 | 394,283 | 458,596 | 518,626 |
| MECHANICAL | - | 135,858 | 185,448 | 181,017 | 239,573 | 398,073 | 490,934 | 541,568 |
| OTHER, N.E.C. | - | 226,013 | 178,074 | 161,322 | 160,460 | 171,174 | 190,292 | 208,953 |
| ALL SCIENCES, TOTAL | 1,373,714 | 1,600,863 | 1,829,427 | 1,842,563 | 1,791,700 | 2,007,850 | 2,216,697 | 2,438,449 |
| PHYSICAL SCIENCES | 1,003,562 | 1,127,323 | 1,270,599 | 1,315,626 | 1,196,457 | 1,326,957 | 1,429,829 | 1,521,412 |
| ASTRONOMY | 46,099 | 59,025 | 67,578 | 65,885 | 73,498 | 80,188 | 76,603 | 82,650 |
| CHEMISTRY | 101,142 | 150,540 | 167,148 | 161,548 | 200,505 | 232,052 | 244,992 | 265,409 |
| PHYSICS | 584,519 | 829,217 | 950,865 | 982,245 | 885,500 | 982,449 | 1,068,356 | 1,129,765 |
| OTHER, N.E.C. | 271,802 | 88,541 | 84,948 | 105,948 | 36,954 | 32,268 | 39,878 | 43,588 |
| ENVIRONMENTAL SCIENCES 1/ | 141,100 | 174,724 | 186,526 | 157,962 | 154,642 | 174,197 | 202,440 | 234,588 |
| ATMOSPHERIC | - | 35,703 | 48,433 | 55,325 | 56,749 | 63,700 | 80,605 | 95,780 |
| EARTH SCIENCES | - | 5,,990 | 42,715 | 37,334 | 37,795 | 40,935 | 46,623 | 50,392 |
| OCEANOGRAPHY | - | 4,306 | 14,276 | 12,201 | 13,068 | 15,958 | 17,061 | 20,494 |
| OTHER, N.E.C. | - | 74,725 | 81,102 | 53,102 | 47,030 | 53,603 | 58,151 | 67,922 |
| MATHEMATICAL SCIENCES | 6,614 | 31,089 | 38,561 | 42,091 | 65,340 | 81,217 | 92,837 | 109,678 |
| COMPUTER SCIENCES | 120,236 | 131,025 | 188,066 | 177,106 | 224,274 | 268,501 | 341,483 | 430,657 |
| LIFE SCIENCES | 73,441 | 76,889 | 85,164 | 84,269 | 104,484 | 106,555 | 117,943 | 114,444 |
| AGRICULTURAL SCIENCES | 1,551 | 645 | 570 | 2,528 | 1,008 | 639 | 633 | 663 |
| BIOLOGICAL SCIENCES | 62,659 | 57,006 | 66,406 | 62,180 | 76,437 | 82,986 | 91,148 | 94,195 |
| MEDICAL SCIENCES | 7,179 | 8,194 | 8,453 | 8,575 | 9,555 | 9,079 | 8,676 | 6,510 |
| OTHER, N.E.C. | 2,052 | 11,044 | 9,735 | 10,986 | 17,484 | 13,851 | 17,486 | 13,076 |
| PSYCHOLOGY | 110 | 135 | 147 | 155 | 194 | 240 | 264 | 294 |
| SOCIAL SCIENCES | 5,861 | 17,449 | 20,984 | 21,412 | 21,067 | 18,056 | 17,591 | 19,343 |
| ECONOMICS | 3,735 | 9,657 | 6,002 | 4,556 | 4,254 | 3,590 | 4,401 | 4,043 |
| POLITICAL SCIENCE | 2,126 | 2,422 | 3,439 | 3,428 | 3,955 | 3,319 | 4,038 | 4,994 |
| SOCIOLOGY | 0 | 1,500 | 2,259 | 2,487 | 0 | 0 | 0 | 0 |
| OTHER, N.E.C. | 0 | 3,870 | 9,284 | 10,941 | 12,858 | 11,147 | 9,152 | 10,306 |
| OTHER SCIENCES, N.E.C. | 22,790 | 42,229 | 39,440 | 43,942 | 25,242 | 32,127 | 14,310 | 8,631 |

1/ DETAIL NOT SEPARATELY AVAILABLE PRIOR TO 1980.

SOURCE: NATIONAL SCIENCE FOUNDATION, SRS

TABLE B-37. SCIENCE/ENGINEERING POSTDOCTORATES
IN DOCTORATE-GRANTING INSTITUTIONS BY FIELD: 1980-86

| FIELD | NUMBER | | | | | | | AVERAGE ANNUAL PERCENT CHANGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1980-85 | 1985-86 | 1980-86 |
| TOTAL, ALL FIELDS | 18,411 | 19,646 | 19,366 | 20,761 | 21,587 | 22,598 | 24,136 | 4.2 | 6.8 | 4.4 |
| ENGINEERING | 978 | 1,040 | 978 | 1,102 | 1,195 | 1,349 | 1,420 | 6.6 | 5.3 | 6.4 |
| AEROSPACE | 20 | 14 | 25 | 32 | 42 | 51 | 48 | 20.6 | -5.9 | 15.7 |
| AGRICULTURAL | 9 | 9 | 6 | 4 | 8 | 15 | 17 | 10.8 | 13.3 | 11.2 |
| BIOMEDICAL | 28 | 24 | 31 | 28 | 24 | 47 | 52 | 10.9 | 10.6 | 10.9 |
| CHEMICAL | 183 | 171 | 174 | 198 | 215 | 273 | 295 | 8.3 | 8.1 | 8.3 |
| CIVIL | 124 | 107 | 108 | 131 | 146 | 122 | 140 | -.3 | 14.8 | 2.0 |
| ELECTRICAL | 121 | 191 | 176 | 174 | 171 | 176 | 172 | 7.8 | -2.3 | 6.0 |
| ENGINEERING SCIENCE | 79 | 87 | 76 | 71 | 63 | 90 | 73 | 2.6 | -18.9 | -1.3 |
| INDUSTRIAL | 16 | 13 | 9 | 14 | 22 | 20 | 29 | 4.6 | 45.0 | 10.4 |
| MECHANICAL | 137 | 130 | 130 | 182 | 196 | 202 | 239 | 8.1 | 18.3 | 9.7 |
| METALLURGICAL/MATERIALS | 172 | 193 | 166 | 204 | 168 | 245 | 249 | 7.3 | 1.6 | 6.4 |
| MINING | 3 | 16 | 10 | 19 | 18 | 19 | 25 | 44.7 | 31.6 | 42.4 |
| NUCLEAR | 22 | 26 | 18 | 15 | 19 | 31 | 31 | 7.1 | .0 | 5.9 |
| PETROLEUM | 6 | 2 | 4 | 1 | 4 | 6 | 1 | .0 | -83.3 | -25.8 |
| ENGINEERING, N.E.C. | 58 | 47 | 45 | 43 | 59 | 52 | 49 | -2.2 | -5.8 | -2.8 |
| SCIENCES, TOTAL | 17,433 | 18,606 | 18,388 | 19,659 | 0,392 | 21,249 | 22,716 | 4.0 | 6.9 | 4.5 |
| PHYSICAL SCIENCES | 4,264 | 4,462 | 4,281 | 4,444 | 4,386 | 4,517 | 4,81_ | 1.2 | 6.6 | 2.0 |
| ASTRONOMY | 141 | 132 | 148 | 111 | 118 | 128 | 123 | -.4 | -3.6 | -1.0 |
| CHEMISTRY | 2,710 | 2,870 | 2,805 | 2,973 | 2,906 | 2,995 | 3,151 | 2.0 | 5.2 | 2.5 |
| PHYSICS | 1,398 | 1,44[illegible] | 1,326 | 1,350 | 1,320 | 1,342 | 1,497 | -.8 | 11.5 | 1.1 |
| PHYSICAL SCIENCES, N.E.C. | 15 | 15 | 2 | 10 | 42 | 42 | 32 | 22.9 | -23.8 | 13.5 |
| ENVIRONMENTAL SCIENCES | 308 | 339 | 33[illegible] | 415 | 488 | 375 | 418 | 4.0 | 11.5 | 5.2 |
| ATMOSPHERIC SCIENCES | 43 | 46 | 32 | 41 | 74 | 48 | 43 | 2.2 | -10.4 | .0 |
| GEOSCIENCES | 194 | 213 | 216 | 237 | 250 | 226 | 247 | 3.1 | 9.3 | 4.1 |
| OCEANOGRAPHY | 57 | 67 | 78 | 120 | 151 | 79 | 98 | 6.7 | 24.1 | 9.5 |
| ENVIRONMENTAL SCIENCES, N.E.C. | 14 | 13 | 9 | 17 | 13 | 22 | 30 | 9.5 | 36.4 | 13.5 |
| MATHEMATICAL SCIENCES | 162 | 113 | 194 | 170 | 203 | 226 | 201 | 6.9 | -11.1 | 3.7 |
| COMPUTER SCIENCES | 43 | 34 | 46 | 82 | 63 | 74 | 74 | 11.5 | .0 | 9.5 |
| LIFE SCIENCES | 11,743 | 12,895 | 12,725 | 13,756 | 14,473 | 15,191 | 1[illegible] | 5.3 | 7.5 | 5.[illegible] |
| AGRICULTURAL SCIENCES | 239 | 284 | 279 | 295 | 358 | 357 | [illegible] | 8.4 | 8.7 | 8.4 |
| BIOLOGICAL SCIENCES | 7,106 | 7,[illegible]06 | 7,756 | 8,386 | 8,740 | 9,229 | 9,857 | 5.4 | 6.8 | 5.6 |
| ANATOMY | 237 | 248 | 261 | 284 | 282 | 310 | 342 | 5.5 | 10.3 | 6.3 |
| BIOCHEMISTRY | 1,599 | 1,724 | 1,684 | 1,765 | 1,803 | 1,892 | 2,027 | 3.4 | 7.1 | 4.0 |
| BIOLOGY | 989 | 870 | 942 | 1,014 | 1,127 | 1,128 | 1,109 | 2.7 | -1.7 | 1.9 |
| BIOMETRY/EPIDEMIOLOGY | 72 | 64 | 53 | 54 | 67 | 59 | 99 | -3.9 | 67.8 | 5.5 |
| BIOPHYSICS | 131 | 155 | 129 | 183 | 121 | 101 | 133 | -7.7 | 31.7 | -2.1 |
| BOTANY | 220 | 240 | 298 | 369 | 347 | 371 | 394 | 11.0 | 6.2 | 10.2 |
| CELL BIOLOGY | 410 | 532 | 516 | 653 | 648 | 731 | 827 | 12.3 | 13.1 | 12.4 |
| ECOLOGY | [illegible] | 44 | 28 | 39 | 36 | 37 | 37 | 11.0 | .0 | 9.1 |
| ENTOMOLOGY/PARASITOLOGY | 119 | 123 | 119 | 112 | 113 | 139 | 143 | 3.2 | 2.9 | 3.1 |
| GENETICS | 258 | 298 | 314 | 344 | 382 | 377 | 428 | 7.9 | 13.5 | 8.8 |
| MICROBIOLOGY | 873 | 967 | 1,014 | 1,025 | 1,071 | 1,148 | 1,274 | 6.0 | 9.1 | 6.5 |
| NUTRITION | 129 | 171 | 138 | 150 | 150 | 202 | 185 | 9.4 | -8.4 | 6.2 |
| PATHOLOGY | 477 | 468 | 540 | 584 | 607 | 621 | 709 | 5.4 | 14.2 | 6.8 |
| PHARMACOLOGY | 624 | 755 | 777 | 801 | 816 | 861 | 885 | 6.7 | 2.8 | 6.0 |
| PHYSIOLOGY | 668 | 758 | 673 | 754 | 817 | [illegible] | 906 | 4.7 | 7.9 | 5.2 |
| ZOOLOGY | 193 | 207 | 203 | 183 | 157 | 212 | 217 | 1.9 | 2.4 | 2.0 |
| BIOSCIENCES, N.E.C. | 65 | 72 | 67 | 72 | 196 | 180 | 142 | 22.6 | -21.1 | 13.9 |
| HEALTH SCIENCES | 4,298 | 4,865 | 4,690 | 5,075 | 5,275 | 5,605 | 6,083 | 5.0 | 8.5 | 5.6 |
| DENTISTRY | 79 | 139 | 246 | 197 | 186 | 224 | 127 | 23.2 | -43.3 | 8.2 |
| NEUROLOGY | 283 | 287 | 254 | 301 | 352 | 332 | 419 | 3.2 | 26.2 | 6.8 |
| NURSING | 9 | 8 | 0 | 6 | 14 | 17 | 16 | 13.6 | -5.9 | 10.1 |
| PHARMACEUTICAL SCIENCES | 233 | 243 | 238 | 241 | 269 | 318 | 384 | 6.4 | 20.8 | 8.7 |
| PREVENTIVE MEDICINE/ COMMUNITY HEALTH | 161 | 135 | 143 | 142 | 168 | 16[illegible] | 194 | .7 | 16.2 | 3.2 |
| SPEECH PATHOLOGY/AUDIOLOGY | 18 | 19 | 10 | 18 | 18 | 18 | 12 | .0 | -33.3 | -6.5 |
| VETERINARY SCIENCES | 52 | 31 | 49 | 50 | 78 | 69 | 100 | 5.8 | 44.9 | 11.5 |
| CLINICAL MEDICINE, N.E.C. | 3,461 | 3,890 | 3,658 | 4,004 | 4,172 | 4,322 | 4,652 | 4.5 | 7.6 | 5.1 |
| HEALTH RELATED, N.E.C. | 102 | 113 | 92 | 116 | 118 | 138 | 179 | 6.2 | 29.7 | 9.8 |
| PSYCHOLOGY | 475 | 471 | 520 | 435 | 422 | 498 | [illegible]46 | 1.0 | 5.6 | 1.7 |
| SOCIAL SCIENCES | 438 | 332 | 287 | 357 | 357 | 368 | 356 | -3.4 | -3.3 | -3.4 |
| AGRICULTURAL ECONOMICS | 8 | 6 | 10 | 28 | 18 | 31 | 35 | 31.1 | 12.9 | 27.9 |
| ANTHROPOLOGY | 40 | 30 | 34 | 60 | 57 | 57 | 52 | 7.3 | -8.8 | 4.5 |
| ECONOMICS (EXCEPT AGRICULTURAL) | 146 | 30 | 13 | 20 | 26 | 19 | 22 | -33.5 | 15.8 | -27.1 |
| GEOGRAPHY | 15 | 23 | 5 | 7 | 14 | 10 | 11 | -7.8 | 10.0 | -5.0 |
| HISTORY AND PHILOSOPHY OF SCIENCE | 15 | 21 | 14 | 19 | 14 | 11 | 11 | -6.0 | .0 | -5.0 |
| LINGUISTICS | 54 | 47 | 47 | 51 | 30 | 26 | 25 | -12.6 | -3.8 | -12.0 |
| POLITICAL SCIENCE | 30 | 46 | 44 | 43 | 31 | 44 | 66 | 8.0 | 50.0 | 14.0 |
| SOCIOLOGY | 99 | 90 | 89 | 99 | 114 | 92 | 84 | -1.5 | -8.7 | -2.7 |
| SOCIOLOGY/ANTHROPOLOGY | 3 | 0 | 2 | 1 | 0 | 2 | 1 | -7.8 | -50.0 | -16.7 |
| SOCIAL SCIENCES, N.E.C. | 28 | 39 | 29 | 29 | 55 | 76 | 49 | 22.1 | -35.5 | 9.8 |

SOURCE: NATIONAL SCIENCE FOUNDATION, SRS.

TABLE B-38. FULL-TIME SCIENCE/ENGINEERING GRADUATE STUDENTS WITH RESEARCH ASSISTANTSHIPS IN DOCTORATE-GRANTING INSTITUTIONS BY FIELD: 1980-86

| FIELD | NUMBER | | | | | | | AVERAGE ANNUAL PERCENT CHANGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1980-85 | 1985-86 | 1980-86 |
| TOTAL, ALL FIELDS | 50,781 | 51,946 | 51,828 | 54,146 | 56,946 | 60,448 | 65,560 | 3.5 | 8.5 | 4.3 |
| ENGINEERING | 13,928 | 14,394 | 14,595 | 15,581 | 16,206 | 17,858 | 20,407 | 5.1 | 14.3 | 6.6 |
| AEROSPACE | 580 | 583 | 617 | 691 | 673 | 725 | 823 | 4.6 | 13.5 | 6.C |
| AGRICULTURAL | 362 | 398 | 427 | 433 | 439 | 410 | 447 | 2.5 | 9.0 | 3.6 |
| BIOMEDICAL | 215 | 253 | 304 | 326 | 391 | 415 | 518 | 14.1 | 24.8 | 15.8 |
| CHEMICAL | 1,844 | 2,018 | 2,097 | 2,253 | 2,325 | 2,454 | 2,581 | 5.9 | 5.2 | 5.8 |
| CIVIL | 2,190 | 2,196 | 2,104 | 2,351 | 2,480 | 2,469 | 2,829 | 2.4 | 14.6 | 4.4 |
| ELECTRICAL | 2,830 | 2,860 | 2,933 | 3,180 | 3,129 | 3,643 | 4,393 | 5.2 | 20.6 | 7.6 |
| ENGINEERING SCIENCE | 432 | 491 | 493 | 439 | 456 | 496 | 559 | 2.8 | 12.7 | 4.4 |
| INDUSTRIAL | 586 | 539 | 535 | 446 | 554 | 586 | 724 | .0 | 23.5 | 3.6 |
| MECHANICAL | 2,045 | 2,134 | 2,200 | 2,347 | 2,632 | 3,254 | 3,661 | 9.7 | 12.5 | 10.2 |
| METALLURGICAL/MATERIALS | 1,390 | 1,553 | 1,512 | 1,675 | 1,749 | 1,961 | 2,238 | 7.1 | 14.1 | 8.3 |
| MINING | 120 | 161 | 147 | 122 | 142 | 143 | 158 | 3.6 | 10.5 | 4.7 |
| NUCLEAR | 508 | 480 | 412 | 436 | 495 | 460 | 506 | -2.0 | 10.0 | -.1 |
| PETROLEUM | 104 | 118 | 100 | 158 | 158 | 151 | 158 | 7.7 | 4.6 | 7.2 |
| ENGINEERING, N.E.C. | 722 | 610 | 724 | 724 | 643 | 691 | 812 | -.9 | 17.5 | 2.0 |
| SCIENCES, TOTAL | 36,853 | 37,552 | 37,233 | 38,565 | 40,740 | 42,590 | 45,153 | 2.9 | 6.0 | 3.4 |
| PHYSICAL SCIENCES | 8,258 | 8,524 | 8,683 | 9,060 | 9,517 | 10,174 | 10,847 | 4.3 | 6.6 | 4.6 |
| ASTRONOMY | 270 | 263 | 250 | 279 | 307 | 305 | 323 | 2.5 | 5.9 | 3.0 |
| CHEMISTRY | 4,539 | 4,730 | 4,838 | 5,118 | 5,312 | 5,727 | 6,103 | 4.8 | 6.6 | 5.1 |
| PHYSICS | 3,445 | 3,516 | 3,569 | 3,626 | 3,865 | 4,097 | 4,374 | 3.5 | 6.8 | 4.1 |
| PHYSICAL SCIENCES, N.E.C. | 4 | 15 | 26 | 37 | 33 | 45 | 47 | 62.3 | 4.4 | 50.8 |
| ENVIRONMENTAL SCIENCES | 3,664 | 3,402 | 3,265 | 3,481 | 3,506 | 3,676 | 3,789 | .1 | 3.1 | .6 |
| ATMOSPHERIC SCIENCES | 488 | 455 | 456 | 432 | 429 | 446 | 418 | -1.8 | -6.3 | -2.5 |
| GEOSCIENCES | 2,014 | 1,796 | 1,762 | 1,959 | 1,945 | 2,121 | 2,086 | 1.0 | -1.7 | .6 |
| OCEANOGRAPHY | 800 | 791 | 780 | 784 | 807 | 845 | 943 | 1.1 | 11.6 | 2.8 |
| ENVIRONMENTAL SCIENCES, N.E.C. | 362 | 360 | 267 | 306 | 295 | 264 | 342 | -6.1 | 29.5 | -.9 |
| MATHEMATICAL SCIENCES | 773 | 732 | 822 | 775 | 846 | 969 | 1,012 | 4.6 | 4.4 | 4.6 |
| COMPUTER SCIENCES | 1,023 | 1,068 | 1,151 | 1,367 | 1,582 | 2,020 | 2,284 | 14.6 | 13.1 | 14.3 |
| LIFE SCIENCES | 15,477 | 15,925 | 15,825 | 16,061 | 17,229 | 17,657 | 18,991 | 2.7 | 7.6 | 3.5 |
| AGRICULTURAL SCIENCES | 4,484 | 4,647 | 4,558 | 4,509 | 4,612 | 4,308 | 4,612 | -.8 | 7.1 | .5 |
| BIOLOGICAL SCIENCES | 9,545 | 9,801 | 9,774 | 9,986 | 10,820 | 11,189 | 12,059 | 3.2 | 7.8 | 4.0 |
| ANATOMY | 142 | 128 | 141 | 149 | 182 | 180 | 181 | 4.9 | .6 | 4.1 |
| BIOCHEMISTRY | 1,454 | 1,549 | 1,617 | 1,740 | 1,923 | 2,040 | 2,245 | 7.0 | 10.0 | 7.5 |
| BIOLOGY | 1,245 | 1,260 | 1,201 | 1,275 | 1,329 | 1,285 | 1,461 | .6 | 13.7 | 2.7 |
| BIOMETRY/EPIDEMIOLOGY | 117 | 100 | 99 | 100 | 119 | 124 | 159 | 1.2 | 28.2 | 5.2 |
| BIOPHYSICS | 161 | 124 | 131 | 157 | 154 | 153 | 199 | -1.0 | 30.1 | 3.6 |
| BOTANY | 1,282 | 1,253 | 1,227 | 1,165 | 1,302 | 1,226 | 1,207 | -.9 | -1.5 | -1.0 |
| CELL BIOLOGY | 210 | 266 | 296 | 363 | 433 | 453 | 608 | 16.6 | 34.2 | 19.4 |
| ECOLOGY | 272 | 221 | 233 | 202 | 231 | 232 | 266 | -3.1 | 14.7 | -.4 |
| ENTOMOLOGY/PARASITOLOGY | 890 | 806 | 764 | 771 | 717 | 686 | 680 | -5.1 | -.9 | -4.4 |
| GENETICS | 235 | 252 | 260 | 238 | 235 | 308 | 418 | 5.6 | 35.7 | 10.1 |
| MICROBIOLOGY | 933 | 1,033 | 1,024 | 1,123 | 1,247 | 1,396 | 1,420 | 8.4 | 1.7 | 7.3 |
| NUTRITION | 1,135 | 1,114 | 1,066 | 1,059 | 1,124 | 1,124 | 1,102 | -.2 | -2.0 | -.5 |
| PATHOLOGY | 165 | 177 | 205 | 227 | 259 | 275 | 307 | 10.8 | 11.6 | 10.9 |
| PHARMACOLOGY | 349 | 438 | 414 | 456 | 451 | 519 | 548 | 8.3 | 5.6 | 7.8 |
| PHYSIOLOGY | 417 | 462 | 432 | 382 | 494 | 542 | 597 | 5.4 | 10.1 | 6.2 |
| ZOOLOGY | 380 | 436 | 272 | 375 | 341 | 321 | 308 | -3.3 | -4.0 | -3.4 |
| BIOSCIENCES, N.E.C. | 158 | 172 | 192 | 199 | 277 | 325 | 353 | 15.5 | 8.6 | 14.3 |
| HEALTH SCIENCES | 1,448 | 1,477 | 1,493 | 1,566 | 1,797 | 2,160 | 2,320 | 8.3 | 7.4 | 8.2 |
| DENTISTRY | 26 | 10 | 12 | 8 | 18 | 10 | 12 | -17.4 | 20.0 | -12.1 |
| NEUROLOGY | 51 | 33 | 49 | 53 | 82 | 96 | 111 | 13.5 | 15.6 | 13.8 |
| NURSING | 101 | 107 | 128 | 160 | 232 | 249 | 313 | 19.8 | 25.7 | 20.7 |
| PHARMACEUTICAL SCIENCES | 400 | 407 | 376 | 409 | 459 | 494 | 518 | 4.3 | 4.9 | 4.4 |
| PREVENTIVE MEDICINE/ COMMUNITY HEALTH | 185 | 233 | 202 | 166 | 178 | 219 | 312 | 3.4 | 42.5 | 9.1 |
| SPEECH PATHOLOGY/AUDIOLOGY | 267 | 251 | 302 | 277 | 217 | 303 | 329 | 2.6 | 8.6 | 3.5 |
| VETERINARY SCIENCES | 157 | 167 | 161 | 163 | 203 | 263 | 252 | 10.9 | -4.2 | 8.2 |
| CLINICAL MEDICINE, N.E.C. | 118 | 108 | 135 | 179 | 156 | 196 | 190 | 10.7 | -3.1 | 8.3 |
| HEALTH RELATED, N.E.C. | 143 | 161 | 128 | 151 | 252 | 330 | 283 | 18.2 | -14.2 | 12.0 |
| PSYCHOLOGY | 2,342 | 2,664 | 2,510 | 2,657 | 2,762 | 2,867 | 2,889 | 4.1 | .8 | 3.6 |
| SOCIAL SCIENCE | 5,316 | 5,237 | 4,977 | 5,164 | 5,2[illegible] | 5,227 | 5,341 | -.3 | 2.2 | .1 |
| AGRICULTURAL ECONOMICS | 962 | 936 | 829 | 814 | 858 | 831 | 923 | -2.9 | 11.1 | -.7 |
| ANTHROPOLOGY | 349 | 303 | 314 | 281 | 292 | 270 | 276 | -5.0 | 2.2 | -3.8 |
| ECONOMICS (EXCEPT AGRICULTURAL) | 1,185 | 1,153 | 1,024 | 1,138 | 1,045 | 1,074 | 1,043 | -1.9 | -2.9 | -2.1 |
| GEOGRAPHY | 249 | 229 | 213 | 230 | 274 | 297 | 271 | 3.6 | -8.8 | 1.4 |
| HISTORY AND PHILOSOPHY OF SCIENCE | 14 | 16 | 11 | 7 | 10 | 11 | 23 | -4.7 | 109.1 | 8.6 |
| LINGUISTICS | 143 | 180 | 140 | 134 | 135 | 163 | 126 | 2.7 | -22.7 | -2.1 |
| POLITICAL SCIENCE | 852 | 841 | 882 | 948 | 1,020 | 967 | 956 | 2.6 | -1.1 | 1.9 |
| SOCIOLOGY | 732 | 713 | 633 | 575 | 628 | 625 | 611 | -3.1 | -2.2 | -3.0 |
| SOCIOLOGY/ANTHROPOLOGY | 81 | 120 | 127 | 120 | 120 | 103 | 115 | 4.9 | 11.7 | 6.0 |
| SOCIAL SCIENCES, N.E.C. | 749 | 746 | 804 | 915 | 916 | 886 | 997 | 3.4 | 12.5 | 4.9 |

SOURCE: NATIONAL SCIENCE FOUNDATION, SRS.

# Table B-39. Scientists and engineers by field, sex, and employment status: 1976 and 1986

| Field and sex | 1976 | | | | | 1986 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total population | Total employed | Employed in science/ engineering | Unemployed, seeking | Outside the labor force | Total population | Total employed | Employed in science/ engineering | Unemployed, seeking | Outside the labor force |
| Total, all fields | 2,530,100 | 2,331,200 | 2,122,100 | 82,100 | 116,800 | 4,971,900 | 4,626,500 | 3,919,900 | 72,700 | 272,700 |
| Men | 2,295,300 | 2,131,800 | 1,947,200 | 70,700 | 93,000 | 4,207,400 | 3,927,800 | 3,393,700 | 53,400 | 226,200 |
| Women | 234,800 | 199,700 | 174,900 | 11,300 | 23,800 | 764,400 | 698,600 | 526,200 | 19,400 | 46,500 |
| Total scientists | 1,048,400 | 959,500 | 843,800 | 36,500 | 52,400 | 2,337,000 | 2,186,300 | 1,676,400 | 41,900 | 108,700 |
| Men | 837,900 | 781,300 | 689,100 | 25,700 | 30,800 | 1,681,000 | 1,586,700 | 1,242,600 | 25,100 | 69,100 |
| Women | 210,600 | 178,200 | 154,700 | 10,700 | 21,600 | 656,000 | 599,600 | 433,600 | 16,800 | 39,600 |
| Physical scientists | 203,900 | 188,900 | 154,900 | 5,900 | 9,100 | 312,800 | 288,400 | 264,900 | 4,200 | 20,000 |
| Men | 185,400 | 172,700 | 143,600 | 5,200 | 7,500 | 269,100 | 250,100 | 229,500 | 3,000 | 16,000 |
| Women | 18,500 | 16,200 | 11,300 | 700 | 1,500 | 43,600 | 38,300 | 35,400 | 1,200 | 4,000 |
| Mathematical scientists | 55,000 | 48,600 | 43,800 | 2,500 | 3,800 | 140,300 | 131,000 | 103,900 | 1,700 | 7,500 |
| Men | 40,700 | 37,100 | 33,700 | 1,900 | 1,700 | 102,600 | 97,100 | 78,900 | 600 | 4,700 |
| Women | 14,300 | 11,500 | 10,000 | 700 | 2,100 | 37,700 | 33,900 | 25,000 | 900 | 2,800 |
| Computer specialists | 125,900 | 119,000 | 116,000 | 3,000 | 3,900 | 575,800 | 562,600 | 437,200 | 4,800 | 6,400 |
| Men | 101,800 | 96,400 | 95,100 | 1,800 | 1,400 | 404,600 | 400,000 | 308,700 | 2,200 | 2,400 |
| Women | 24,300 | 20,600 | 20,900 | 1,200 | 2,500 | 171,200 | 162,500 | 128,400 | 2,600 | 6,000 |
| Environmental scientists | 56,300 | 54,800 | 46,600 | 1,200 | 2,300 | 123,200 | 111,300 | 97,300 | 5,100 | 6,800 |
| Men | 53,800 | 50,900 | 44,000 | 1,000 | 1,800 | 108,000 | 98,400 | 87,200 | 4,000 | 5,800 |
| Women | 4,500 | 3,900 | 2,600 | 100 | [illegible] | 15,200 | 12,900 | 10,100 | 1,200 | 1,200 |
| Life scientists | 230,700 | 213,500 | 193,200 | 6,300 | 10,900 | 452,100 | 411,800 | 340,500 | 6,800 | 31,500 |
| Men | 191,800 | 176,800 | 157,700 | 4,900 | 7,300 | 333,900 | 309,000 | 257,100 | 5,200 | 19,700 |
| Women | 38,900 | 33,900 | 30,500 | 1,400 | 3,600 | 118,200 | 102,800 | 83,300 | 3,600 | 11,800 |
| Psychologists | 122,500 | 112,500 | 103,700 | 5,700 | 4,300 | 273,800 | 253,500 | 172,800 | 6,800 | 13,500 |
| Men | 81,800 | 76,900 | 71,800 | 3,300 | 1,600 | 149,100 | 136,400 | 99,500 | 3,100 | 7,700 |
| Women | 40,700 | 35,600 | 32,000 | 2,400 | 2,700 | 124,500 | 115,200 | 73,300 | 3,800 | 5,800 |
| Social scientists | 232,200 | 222,300 | 180,500 | 11,900 | 16,100 | 459,400 | 427,800 | 259,800 | 10,800 | 21,000 |
| Men | 182,800 | 165,700 | 133,200 | 7,800 | 9,500 | 313,700 | 293,800 | 161,800 | 6,800 | 13,100 |
| Women | 69,400 | 56,600 | 47,300 | 4,200 | 6,600 | 145,700 | 134,000 | 78,000 | 3,700 | 7,900 |
| Total engineers | 1,481,700 | 1,371,700 | 1,278,300 | 45,600 | 64,400 | 2,634,900 | 2,440,100 | 2,243,500 | 30,800 | 164,000 |
| Men | 1,457,500 | 1,350,300 | 1,258,100 | 45,000 | 62,200 | 2,526,400 | 2,241,100 | 2,150,900 | 23,200 | 157,100 |
| Women | 24,200 | 21,400 | 20,200 | 600 | 2,200 | 108,400 | 99,000 | 92,600 | 2,600 | 6,900 |
| Aeronautical/astronautical | 62,300 | 58,800 | 55,700 | 2,400 | 3,200 | 117,300 | 110,500 | 104,200 | 500 | 6,200 |
| Men | 61,500 | 58,400 | 55,100 | 2,400 | 2,700 | 112,800 | 106,200 | 100,300 | 400 | 6,200 |
| Women | 900 | 400 | 600 | (2) | 400 | 4,500 | 4,300 | 3,900 | 100 | 100 |
| Chemical | 83,900 | 77,500 | 76,400 | 1,800 | 4,600 | 171,700 | 149,000 | 131,500 | 4,000 | 16,800 |
| Men | 81,000 | 75,000 | 73,700 | 1,800 | 4,400 | 156,700 | 137,800 | 121,200 | 3,800 | 17,300 |
| Women | 3,000 | 2,500 | 2,800 | 200 | 200 | 13,000 | 11,200 | 10,300 | 500 | 300 |
| Civil | 201,800 | 188,200 | 182,800 | 5,300 | 8,400 | 361,400 | 346,300 | 319,100 | 5,900 | 29,300 |
| Men | 195,900 | 182,800 | 178,100 | 4,900 | 8,200 | 367,400 | 333,400 | 307,200 | 5,400 | 28,800 |
| Women | 6,000 | 5,400 | 4,600 | 400 | 100 | 14,100 | 12,900 | 11,900 | 500 | 700 |
| Electrical/electronics | 295,800 | 283,000 | 267,900 | 5,100 | 7,600 | 620,700 | 574,500 | 540,800 | 6,200 | 40,100 |
| Men | 293,200 | 281,400 | 266,500 | 5,100 | 6,700 | 599,400 | 555,500 | 523,200 | 6,000 | 37,900 |
| Women | 2,400 | 1,600 | 1,400 | (2) | 900 | 21,300 | 18,900 | 17,600 | 200 | 2,100 |
| Industrial | (1) | (1) | (1) | (1) | (1) | 144,900 | 137,700 | 113,100 | 1,500 | 5,700 |
| Men | (1) | (1) | (1) | (1) | (1) | 137,500 | 130,600 | 106,600 | 1,400 | 5,500 |
| Women | (1) | (1) | (1) | (1) | (1) | 7,400 | 7,100 | 6,500 | 100 | 200 |
| Materials | (1) | (1) | (1) | (1) | (1) | 57,400 | 53,100 | 46,800 | 900 | 3,400 |
| Men | (1) | (1) | (1) | (1) | (1) | 54,100 | 50,500 | 44,500 | 400 | 3,200 |
| Women | (1) | (1) | (1) | (1) | (1) | 3,300 | 2,500 | 2,300 | 500 | 200 |
| Mechanical | 297,800 | 276,200 | 272,800 | 12,300 | 9,300 | 547,800 | 492,600 | 453,700 | 6,700 | 48,400 |
| Men | 295,400 | 273,900 | 270,600 | 12,300 | 9,200 | 532,300 | 478,600 | 440,100 | 6,400 | 47,300 |
| Women | 2,500 | 2,300 | 2,200 | (2) | 100 | 15,500 | 14,000 | 13,600 | 400 | 1,100 |
| Other engineers | 540,100 | 490,000 | 422,700 | 16,700 | 31,300 | 593,700 | 576,400 | 534,300 | 5,000 | 12,300 |
| Men | 530,600 | 480,900 | 414,200 | 16,700 | 30,900 | 564,300 | 548,400 | 507,900 | 4,700 | 11,100 |
| Women | 9,500 | 9,100 | 6,500 | (2) | 400 | 29,400 | 27,900 | 26,400 | 300 | 1,100 |

[1]Detail unavailable.
[2]Too few cases to estimate.
NOTE: Because of rounding, detail may not add to totals.
SOURCE: National Science Foundation, SRS

## Table B-40. Employed scientists and engineers by field, sex, and sector of employment: 1976 and 1986

| Field and sex | 1976 | | | | | | 1986 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Industry | Educational institutions | Federal Government | State/local/ other government | Other[3] | Total | Industry | Educational institutions | Federal Government | State/local/ other government | Other[3] |
| Total, all fields | 2,331,200 | 1,456,500 | 287,600 | 219,200 | 137,400 | 230,500 | 4,626,500 | 3,134,500 | 627,000 | 354,100 | 241,700 | 269,200 |
| Men | 2,131,600 | 1,385,100 | 232,400 | 200,600 | 119,900 | 193,600 | 3,527,800 | 2,741,700 | 479,200 | 310,400 | 202,000 | 194,500 |
| Women | 199,700 | 71,400 | 55,200 | 18,500 | 17,600 | 37,000 | 698,800 | 392,800 | 147,800 | 43,700 | 39,700 | 74,800 |
| Total scientists | 959,500 | 430,300 | 248,000 | 110,700 | 62,200 | 108,300 | 2,186,300 | 1,193,700 | 526,200 | 167,900 | 125,900 | 172,600 |
| Men | 781,300 | 373,200 | 194,000 | 93,600 | 47,100 | 73,400 | 1,586,700 | 876,200 | 385,000 | 131,800 | 90,400 | 103,300 |
| Women | 178,200 | 57,100 | 54,000 | 17,000 | 15,100 | 35,000 | 599,600 | 317,500 | 141,100 | 36,100 | 35,500 | 69,400 |
| Physical scientists | 186,900 | 105,400 | 39,100 | 22,400 | 5,900 | 16,100 | 286,400 | 163,700 | 71,100 | 29,700 | 8,400 | 15,500 |
| Men | 172,700 | 97,200 | 34,400 | 20,900 | 5,400 | 14,800 | 250,100 | 142,700 | 61,500 | 27,000 | 6,800 | 12,100 |
| Women | 16,200 | 8,200 | 4,700 | 1,500 | 500 | 1,300 | 36,300 | 20,900 | 9,600 | 2,700 | 1,700 | 3,400 |
| Mathematical scientists | 48,600 | 15,000 | 21,100 | 9,000 | 1,300 | 2,200 | 131,000 | 54,700 | 58,700 | 11,100 | 2,200 | 4,300 |
| Men | 37,100 | 12,000 | 15,700 | 7,200 | 700 | 1,500 | 97,100 | 41,900 | 43,400 | 8,100 | 1,200 | 2,500 |
| Women | 11,500 | 2,900 | 5,500 | 1,800 | 600 | 700 | 33,900 | 12,800 | 15,300 | 3,000 | 1,100 | 1,700 |
| Computer specialists | 119,000 | 86,800 | 6,900 | 9,300 | 5,100 | 10,900 | 562,600 | 439,700 | 37,700 | 38,500 | 20,700 | 26,000 |
| Men | 98,400 | 72,300 | 5,800 | 7,700 | 4,100 | 8,500 | 400,000 | 315,700 | 24,900 | 27,000 | 13,900 | 18,500 |
| Women | 20,800 | 14,500 | 1,100 | 1,600 | 1,000 | 2,400 | 162,500 | 124,000 | 12,800 | 11,500 | 6,800 | 7,400 |
| Environmental scientists | 54,800 | 30,900 | 6,100 | 10,100 | 2,200 | 5,500 | 111,300 | 65,100 | 18,200 | 17,800 | 5,900 | 4,500 |
| Men | 50,900 | 28,900 | 5,200 | 9,300 | 2,100 | 5,400 | 98,400 | 58,400 | 15,800 | 15,500 | 5,100 | 3,800 |
| Women | 3,900 | 2,000 | 900 | 800 | 100 | 100 | 12,900 | 6,800 | 2,400 | 2,200 | 700 | 600 |
| Life scientists | 213,500 | 71,500 | 63,300 | 39,300 | 20,300 | 19,100 | 411,800 | 153,100 | 147,900 | 42,400 | 31,800 | 36,800 |
| Men | 179,800 | 63,800 | 50,800 | 34,200 | 17,700 | 13,300 | 309,000 | 117,800 | 111,000 | 33,100 | 25,800 | 21,700 |
| Women | 33,900 | 7,900 | 12,600 | 5,200 | 2,600 | 5,800 | 102,800 | 35,500 | 37,000 | 9,300 | 6,000 | 15,000 |
| Psychologists | 112,500 | 26,400 | 43,800 | 5,200 | 7,600 | 29,500 | 253,500 | 101,800 | 79,400 | 6,900 | 14,800 | 50,800 |
| Men | 76,900 | 20,400 | 28,900 | 3,100 | 5,100 | 18,400 | 138,400 | 51,300 | 47,900 | 3,700 | 9,200 | 26,300 |
| Women | 35,600 | 6,000 | 13,900 | 2,100 | 2,500 | 11,100 | 115,200 | 50,500 | 31,500 | 3,200 | 5,600 | 24,400 |
| Social scientists | 222,300 | 94,400 | 67,700 | 15,300 | 19,900 | 25,000 | 427,800 | 215,500 | 113,100 | 21,800 | 42,300 | 35,100 |
| Men | 165,700 | 78,800 | 52,300 | 11,200 | 11,900 | 11,500 | 293,800 | 148,600 | 80,800 | 17,500 | 28,700 | 18,400 |
| Women | 56,600 | 15,600 | 15,500 | 4,000 | 7,800 | 13,700 | 134,000 | 66,900 | 32,500 | 4,300 | 13,600 | 16,800 |
| Total engineers | 1,371,700 | 1,026,200 | 39,800 | 108,500 | 75,200 | 122,200 | 2,440,100 | 1,940,800 | 100,900 | 186,200 | 115,800 | 96,400 |
| Men | 1,350,300 | 1,011,900 | 38,400 | 107,000 | 72,800 | 120,200 | 2,341,100 | 1,865,500 | 94,100 | 178,500 | 111,500 | 91,500 |
| Women | 21,400 | 14,300 | 1,200 | 1,500 | 2,500 | 1,900 | 99,000 | 75,300 | 5,700 | 7,800 | 4,300 | 5,100 |
| Aeronautical/astronautical | 56,800 | 40,300 | 1,800 | 11,100 | 700 | 2,900 | 110,500 | 80,900 | 3,800 | 17,700 | 400 | 7,700 |
| Men | 56,400 | 39,900 | 1,800 | 11,100 | 700 | 2,900 | 106,200 | 78,500 | 3,600 | 16,800 | 400 | 6,900 |
| Women | 400 | 400 | (1) | (1) | (1) | (1) | 4,300 | 2,300 | 200 | 900 | (1) | 900 |
| Chemical | 77,500 | 69,200 | 900 | 2,700 | 1,100 | 3,600 | 142,000 | 128,300 | 7,200 | 6,700 | 1,900 | 4,900 |
| Men | 75,000 | 67,100 | 900 | 2,600 | 900 | 3,500 | 137,800 | 118,800 | 6,500 | 6,300 | 1,800 | 4,400 |
| Women | 2,500 | 2,100 | (1) | 100 | 200 | 100 | 11,200 | 9,500 | 600 | 400 | 100 | 400 |
| Civil | 188,200 | 88,800 | 5,500 | 21,300 | 50,800 | 21,800 | 346,300 | 215,000 | 16,500 | 32,800 | 76,200 | 11,800 |
| Men | 182,800 | 86,900 | 5,200 | 20,900 | 48,700 | 21,100 | 333,400 | 208,200 | 8,900 | 31,400 | 73,600 | 11,300 |
| Women | 5,400 | 1,900 | 300 | 400 | 2,000 | 600 | 12,900 | 6,800 | 1,700 | 1,400 | 2,600 | 400 |
| Electrical/electronics | 281,700 | 223,500 | 10,800 | 28,300 | 4,500 | 15,900 | 574,500 | 463,300 | 27,200 | 53,700 | 6,800 | 23,500 |
| Men | 281,200 | 222,400 | 10,700 | 28,300 | 4,500 | 15,500 | 555,500 | 448,100 | 25,900 | 52,300 | 6,600 | 22,600 |
| Women | 1,600 | 1,100 | 100 | (1) | (1) | 400 | 19,900 | 15,100 | 1,300 | 1,400 | 200 | 900 |
| Industrial | (2) | (2) | (2) | (2) | (2) | (2) | 137,700 | 121,100 | 4,700 | 6,000 | 2,100 | 3,800 |
| Men | (2) | (2) | (2) | (2) | (2) | (2) | 130,600 | 114,800 | 4,500 | 5,600 | 2,000 | 3,700 |
| Women | (2) | (2) | (2) | (2) | (2) | (2) | 7,100 | 6,300 | 200 | 400 | (1) | 200 |
| Materials | (2) | (2) | (2) | (2) | (2) | (2) | 53,100 | 45,200 | 4,000 | 2,200 | 300 | 1,400 |
| Men | (2) | (2) | (2) | (2) | (2) | (2) | 50,500 | 43,100 | 3,900 | 1,900 | 300 | 1,300 |
| Women | (2) | (2) | (2) | (2) | (2) | (2) | 2,500 | 2,100 | 100 | 200 | (1) | 100 |
| Mechanical | 276,200 | 230,400 | 8,700 | 15,400 | 3,200 | 18,500 | 492,800 | 426,100 | 16,300 | 30,000 | 4,600 | 13,800 |
| Men | 273,900 | 228,400 | 6,800 | 15,100 | 3,200 | 18,500 | 478,800 | 414,500 | 17,400 | 29,200 | 4,400 | 13,100 |
| Women | 2,300 | 1,900 | 100 | 300 | (1) | (1) | 14,000 | 11,600 | 900 | 800 | 200 | 500 |
| Other engineers | 490,000 | 374,000 | 11,900 | 29,800 | 14,900 | 59,600 | 576,400 | 460,900 | 25,200 | 37,100 | 23,500 | 29,700 |
| Men | 480,900 | 367,100 | 11,200 | 29,000 | 14,700 | 58,900 | 548,500 | 439,500 | 23,400 | 35,000 | 22,400 | 28,200 |
| Women | 9,100 | 6,900 | 600 | 700 | 200 | 700 | 28,100 | 21,600 | 1,500 | 2,100 | 1,200 | 1,700 |

[1]Too few cases to estimate
[2]Detail unavailable.
[3]Includes nonprofit organizations, military, other, and no report
NOTE: Because of rounding, detail may not add to totals.
SOURCE: National Science Foundation, SRS

# Table B-41. Employed scientists and engineers by field, sex, and primary work activity: 1976 and 1986

| Field and sex | 1976 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Research and Development | | | | Management, Administration | | | | |
| | Total employed | Total | Basic research | Appld. research | Devel-opment | Total | Of R&D | Other than R&D | Teaching | Other[1] |
| Total, all fields | 2,331,200 | 655,500 | 69,500 | 147,700 | 438,400 | 687,100 | 220 000 | 467,100 | 163,300 | 825,300 |
| Men | 2,131,600 | 606,200 | 55,400 | 127,800 | 423,000 | 652,900 | 209,500 | 443,300 | 131,800 | 740,700 |
| Women | 199,700 | 49,300 | 14,100 | 19,800 | 15,400 | 34,200 | 10,400 | 23,800 | 31,500 | 84,700 |
| Total scientists | 959,500 | 231,000 | 63,400 | 102,400 | 65,300 | 283,500 | 88,300 | 175,100 | 141,300 | 323,700 |
| Men | 781,300 | 191,500 | 50,000 | 84,800 | 56,800 | 232,600 | 79,700 | 152,800 | 109,900 | 247,300 |
| Women | 178,200 | 39,500 | 13,400 | 17,500 | 8,800 | 30,900 | 8,600 | 22,300 | 31,300 | 76,400 |
| Physical scientists | 188,900 | 77,800 | 20,000 | 33,400 | 24,200 | 50,700 | 29,900 | 20,800 | 22,700 | 37,900 |
| Men | 172,700 | 70,700 | 17,600 | 30,100 | 23,000 | 48,400 | 29,300 | 1,900 | 20,300 | 33,300 |
| Women | 16,200 | 6,800 | 2,400 | 3,300 | 1,200 | 2,300 | 600 | 1,700 | 2,300 | 4,800 |
| Mathematical scientists | 48,800 | 8,300 | 1,900 | 3,800 | 2,600 | 13,800 | 6,200 | 7,600 | 17,400 | 9,100 |
| Men | 37,100 | 6,400 | 1,900 | 2,900 | 1,600 | 12,200 | 4,900 | 7,300 | 12,500 | 6,000 |
| Women | 11,500 | 1,900 | (3) | 900 | 1,000 | 1,800 | 1,300 | 300 | 5,000 | 3,000 |
| Computer specialists | 119,000 | 27,500 | 400 | 1,500 | 25,600 | 24,800 | 8,200 | 16,600 | 3,800 | 62,900 |
| Men | 98,400 | 21,800 | 300 | 1,200 | 20,100 | 22,800 | 7,400 | 15,400 | 2,900 | 51,100 |
| Women | 20,600 | 5,900 | 100 | 300 | 5,500 | 2,000 | 900 | 1,200 | 900 | 11,800 |
| Environmental scientists | 54,800 | 22,900 | 6,500 | 12,900 | 3,600 | 14,900 | 6,500 | 8,400 | 3,100 | 13,900 |
| Men | 50,900 | 20,000 | 5,300 | 11,200 | 3,500 | 14,800 | 6,400 | 8,400 | 2,700 | 13,400 |
| Women | 3,900 | 2,900 | 1,200 | 1,700 | 100 | 200 | 200 | (3) | 400 | 400 |
| Life scientists | 213,500 | 64,800 | 26,300 | 31,400 | 7,100 | 62,300 | 19,800 | 43,700 | 29,300 | 57,100 |
| Men | 179,600 | 50,800 | 19,200 | 25,300 | 5,400 | 56,800 | 17,800 | 39,100 | 23,300 | 48,900 |
| Women | 33,900 | 14,000 | 7,100 | 6,100 | 800 | 5,700 | 1,100 | 4,800 | 6,000 | 8,200 |
| Psychologists | 112,500 | 7,900 | 3,200 | 3,600 | 1,200 | 22,000 | 4,800 | 17,400 | 21,600 | 61,000 |
| Men | 76,900 | 5,900 | 2,200 | 2,500 | 1,200 | 17,400 | 3,900 | 13,500 | 14,300 | 39,300 |
| Women | 35,600 | 2,000 | 1,000 | 1,000 | (3) | 4,600 | 700 | 3,900 | 7,400 | 21,600 |
| Social Scientists | 222,300 | 22,000 | 5,100 | 15,900 | 1,000 | 74,800 | 14,200 | 60,700 | 43,400 | 82,100 |
| Men | 165,700 | 15,900 | 3,500 | 11,600 | 900 | 60,400 | 10,300 | 50,100 | 34,000 | 55,400 |
| Women | 56,600 | 6,000 | 1,600 | 4,300 | 100 | 14,400 | 3,900 | 10,500 | 9,400 | 26,800 |
| Total engineers | 1,371,700 | 424,500 | 6,100 | 45,300 | 373,100 | 423,800 | 131,700 | 292,000 | 22,000 | 501,600 |
| Men | 1,350,300 | 414,700 | 5,400 | 43,000 | 366,400 | 420,300 | 129,800 | 290,500 | 21,900 | 493,400 |
| Women | 21,400 | 9,800 | 700 | 2,300 | 6,800 | 3,300 | 1,800 | 1,500 | 200 | 8,100 |
| Aeronautical/astronautical | 56,800 | 25,400 | 900 | 4,500 | 20,000 | 19,000 | 13,900 | 5,100 | 1,000 | 11,400 |
| Men | 56,400 | 25,000 | 900 | 4,400 | 19,700 | 19,000 | 13,900 | 5,100 | 1,000 | 11,400 |
| Women | 400 | 400 | (3) | 100 | 300 | (3) | (3) | (-) | (3) | (3) |
| Chemical | 77,500 | 28,400 | 200 | 4,200 | 24,000 | 28,600 | 8,600 | 20,000 | 600 | 19,900 |
| Men | 75,000 | 27,800 | 200 | 3,800 | 23,800 | 28,100 | 8,100 | 20,000 | 600 | 18,500 |
| Women | 2,500 | 500 | (3) | 300 | 200 | 500 | 500 | (3) | (3) | 1,500 |
| Civil | 188,200 | 34,400 | 300 | 3,100 | 31,000 | 64,800 | 6,000 | 58,800 | 2,300 | 86,700 |
| Men | 182,800 | 31,900 | 300 | 2,300 | 29,300 | 64,000 | 6,000 | 58,000 | 2,200 | 84,700 |
| Women | 5,400 | 2,500 | (3) | 800 | 1,700 | 800 | (3) | 800 | 100 | 2,000 |
| Electrical/electronics | 283,000 | 114,300 | 1,400 | 10,400 | 102,500 | 87,100 | 38,900 | 48,200 | 4,800 | 900 |
| Men | 281,400 | 113,700 | 1,400 | 10,400 | 101,900 | 86,900 | 38,700 | 48,200 | 4,800 | 76,300 |
| Women | 1,600 | 600 | (3) | (3) | 600 | 200 | 200 | (3) | (3) | 800 |
| Industrial | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) |
| Men | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) |
| Women | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) |
| Materials | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) |
| Men | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) |
| Women | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) | (2) |
| Mechanical | 276,200 | 112,900 | 700 | 7,400 | 104,700 | 88,800 | 29,700 | 59,100 | 5,500 | 69,000 |
| Men | 273,900 | 112,100 | 700 | 7,400 | 104,100 | 87,900 | 28,700 | 59,100 | 5,500 | 68,400 |
| Women | 2,300 | 700 | 100 | (3) | 700 | 1,000 | 1,000 | (3) | (3) | 600 |
| Other engineers | 490,000 | 109,200 | 2,500 | 15,700 | 91,000 | 135,300 | 34,800 | 100,700 | 7,900 | 237,600 |
| Men | 480,900 | 104,200 | 1,800 | 14,700 | 87,700 | 134,500 | 34,400 | 100,100 | 7,900 | 234,300 |
| Women | 9,100 | 5,000 | 600 | 1,100 | 3,300 | 800 | 200 | 600 | (3) | 3,300 |

[1]Includes consulting, production/inspection, reporting/statistical work/computing, sales; professional services, other; and no report
[2]Detail unavailable
[3]Too few cases to estimate

## Table B-11. Employed scientists and engineers by field, sex, and primary work activity: 1976 and 1986—Con.

| Field and sex | 1986 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Research and Development | | | | Management, Administration | | | | |
| | Total employed | Total | Basic research | Appld research | Devel-opment | Total | Of R&D | Other than R&D | Teaching | Other[1] |
| Total, all fields | 4,626,500 | 1,268,900 | 135,700 | 257,700 | 875,500 | 1,282,200 | 398,600 | 883,600 | 357,800 | 1,717,600 |
| Men | 3,927,800 | 1,116,700 | 102,700 | 211,700 | 802,300 | 1,148,300 | 367,200 | 781,100 | 276,300 | 1,386,500 |
| Women | 698,800 | 152,200 | 33,000 | 46,000 | 73,200 | 133,800 | 31,400 | 102,500 | 81,500 | 331,100 |
| Total scientists | 2,186,300 | 473,700 | 123,100 | 168,400 | 182,200 | 545,600 | 162,600 | 383,000 | 300,800 | 866,200 |
| Men | 1,586,700 | 362,600 | 91,600 | 129,700 | 141,300 | 424,900 | 135,500 | 289,400 | 223,300 | 575,900 |
| Women | 599,600 | 111,100 | 31,500 | 38,700 | 41,000 | 120,800 | 27,000 | 93,600 | 77,500 | 290,400 |
| Physical scientists | 288,400 | 115,200 | 28,000 | 42,500 | 44,700 | 73,400 | 43,000 | 30,500 | 45,800 | 54,000 |
| Men | 250,100 | 100,500 | 24,500 | 36,300 | 39,700 | 68,200 | 40,900 | 27,300 | 39,000 | 42,400 |
| Women | 38,300 | 14,700 | 3,500 | 6,200 | 5,100 | 5,200 | 2,100 | 3,100 | 6,800 | 11,600 |
| Mathematical scientists | 131,000 | 18,100 | 5,300 | 6,700 | 6,000 | 35,600 | 14,700 | 21,000 | 46,800 | 30,700 |
| Men | 97,100 | 15,200 | 5,000 | 5,400 | 4,700 | 28,400 | 12,200 | 16,300 | 33,800 | 19,700 |
| Women | 33,900 | 2,900 | 300 | 1,300 | 1,300 | 7,200 | 2,500 | 4,700 | 12,900 | 11,000 |
| Computer specialists | 562,600 | 112,800 | 4,200 | 10,900 | 37,800 | 86,800 | 32,800 | 54,000 | 19,600 | 343,400 |
| Men | 400,000 | 83,700 | 3,200 | 8,000 | 72,400 | 70,800 | 27,200 | 43,300 | 12,800 | 232,900 |
| Women | 162,500 | 29,200 | 1,000 | 2,800 | 25,400 | 16,200 | 5,600 | 10,600 | 6,800 | 110,300 |
| Environmental scientists | 111,300 | 36,400 | 10,000 | 19,900 | 6,400 | 21,800 | 7,500 | 14,300 | 9,200 | 43,900 |
| Men | 98,400 | 31,200 | 8,200 | 17,400 | 5,600 | 19,900 | 7,000 | 13,000 | 8,300 | 39,000 |
| Women | 12,900 | 5,100 | 1,800 | 2,600 | 600 | 1,900 | 500 | 1,400 | 900 | 5,000 |
| Life scientists | 1 300 | 128,400 | 57,600 | 55,100 | 15,700 | 110,200 | 30,100 | 80,100 | 61,500 | 111,700 |
| Men | 309,000 | 91,000 | 39,800 | 40,800 | 10,600 | 93,300 | 26,100 | 67,200 | 46,700 | 78,000 |
| Women | 120,800 | 37,400 | 16,000 | 14,300 | 5,100 | 16,900 | 4,000 | 13,000 | 14,700 | 51,800 |
| Psychologists | 253,500 | 20,600 | 7,900 | 9,500 | 3,200 | 65,900 | 9,500 | 56,500 | 39,100 | 127,900 |
| Men | 138,400 | 11,300 | 4,600 | 5,300 | 1,500 | 37,200 | 5,100 | 32,100 | 25,900 | 64,000 |
| Women | 115,200 | 9,300 | 3,300 | 4,300 | 1,700 | 28,700 | 4,300 | 24,400 | 13,200 | 64,000 |
| Social Scientists | 427,800 | 42,200 | 10,100 | 23,700 | 8,500 | 151,600 | 25,200 | 126,600 | 79,000 | 154,800 |
| Men | 293,800 | 29,700 | 6,400 | 16,500 | 6,700 | 107,300 | 17,100 | 90,200 | 56,600 | 100 [illegible]0 |
| Women | 134,000 | 12,600 | 3,600 | 7,200 | 1,700 | 44,500 | 8,100 | 36,400 | 22,300 | 54 [illegible]0 |
| Total engineers | 2,440,100 | 795,200 | 12,700 | 89,300 | 693,200 | 736,800 | 236,000 | 500,800 | 56,900 | 851,400 |
| Men | 2,341,100 | 754,100 | 11,100 | 82,000 | 661,000 | 723,400 | 231,700 | 491,700 | 53,000 | 810,600 |
| Women | 99,000 | 41 100 | 1,500 | 7,400 | 32,200 | 13,400 | 4,300 | 8,900 | 3,900 | 40,800 |
| Aeronautical/astronautical | 110,500 | 50,200 | 1,500 | 8,300 | 40,400 | 30,900 | 20,700 | 10,200 | 2,900 | 26,500 |
| Men | 106,200 | 47,800 | 900 | 7,500 | 39,300 | 30,500 | 20,600 | 9,900 | 2,600 | 25,300 |
| Women | 4,300 | 2,400 | 600 | 800 | 1,100 | 400 | 100 | 300 | 300 | 1,200 |
| Chemical | 149,000 | 51,300 | 1,200 | 7,300 | 42,800 | 50,500 | 18,400 | 32,100 | 3,500 | 43,700 |
| Men | 137,800 | 45,600 | 1,000 | 6,400 | 38,300 | 49,400 | 18,100 | 31,300 | 3,200 | 39,600 |
| Women | 11,200 | 5,600 | 200 | 900 | 4,500 | 1,000 | 300 | 700 | 300 | 4,300 |
| Civil | 346,300 | 53,000 | 900 | 6,600 | 45,500 | 126,800 | 10,700 | 115,900 | 6,800 | 159,900 |
| Men | 333,400 | 49,100 | 800 | 5,800 | 42,500 | 124,500 | 10,700 | 113,800 | 5,700 | 154,100 |
| Women | 12 [illegible]0 | 3,900 | 100 | 800 | 3,000 | 2,100 | 100 | 2,100 | 1,100 | 5,800 |
| Electrical/electronics | 574,500 | 241,400 | 3,400 | 24,800 | 213,300 | 166,500 | 78,700 | 87,800 | 14,000 | 152,600 |
| Men | 555,500 | 231,300 | 3,200 | 23,400 | 204,800 | 164,000 | 77,400 | 86,500 | 13,000 | 147,200 |
| Women | 18,900 | 10,100 | 200 | 1,400 | 8,800 | 2,500 | 1,200 | 1,300 | 1,000 | 5,300 |
| Industrial | 137,700 | 25,700 | 200 | 900 | 24,600 | 47,400 | 8,100 | 39,300 | 3,500 | 61,100 |
| Men | 130,600 | 23,900 | 100 | 600 | 23,200 | 46,200 | 7,800 | 38,400 | 3,400 | 57,100 |
| Women | 7,100 | 1,700 | 100 | 200 | 1,400 | 1,200 | 300 | 900 | 100 | 4,100 |
| Materials | 53,100 | 20,600 | 1,300 | 4,200 | 15,100 | 15,400 | 5,800 | 9,600 | 1,600 | 15,500 |
| Men | 50,500 | 19,400 | 1,200 | 3,900 | 14,300 | 15,100 | 5,800 | 9,400 | 1,600 | 14,400 |
| Women | 2,500 | 1,100 | (3) | 300 | 800 | 300 | 100 | 200 | (3) | 1,100 |
| Mechanical | 492,600 | 207,100 | 2,400 | 14,600 | 190,000 | 149,000 | 51,700 | 97,900 | 9,300 | 127,200 |
| Men | 478,600 | 199,900 | 2,300 | 13,600 | 184,000 | 148,000 | 51,100 | 96,800 | 9,100 | 121,600 |
| Women | 14,000 | 7,200 | 200 | 1,000 | 6,000 | 1,600 | 600 | 1,000 | 200 | 5,000 |
| Other engineers | 578,400 | 145,900 | 1,800 | 22,600 | 121,500 | 150,300 | 41,900 | 107,800 | 15,300 | 264,900 |
| Men | 548,500 | 137,100 | 1,800 | 20,800 | 114,800 | 145,700 | 40,400 | 105,600 | 14,400 | 251,300 |
| Women | 28,100 | 9,100 | 100 | 2,000 | 6,800 | 4,100 | 1,600 | 2,400 | 900 | 14,000 |

NOTE Because of rounding, detail may not add to totals.
SOURCE National Science Foundation, SRS

## Table B-42. Scientists and engineers by field, racial/ethnic group, and employment status: 1976 and 1986

| Field and racial/ethnic group | 1976 | | | | | 1986 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total population | Total employed | Employed in science/ engineering | Unemployed, seeking | Outside the labor force | Total population | Total employed | Employed in science/ engineering | Unemployed, seeking | Outside the labor force |
| Total, all fields[1] | 2,530,100 | 2,331,200 | 2,122,100 | 82,100 | 116,800 | 4,971,900 | 4,626,500 | 3,919,900 | 72,700 | 272,700 |
| White | 2,328,100 | 2,141,900 | 1,949,700 | 73,300 | 112,900 | 4,508,600 | 4,190,400 | 3,556,200 | 61,700 | 256,500 |
| Black | 42,000 | 38,100 | 34,900 | 2,400 | 1,600 | 122,900 | 114,900 | 87,900 | 4,500 | 3,400 |
| Asian | 109,900 | 106,600 | 98,500 | 1,600 | 1,600 | 239,700 | 226,800 | 199,000 | 4,200 | 8,600 |
| Total scientists | 1,048,400 | 959,500 | 843,800 | 36,500 | 52,400 | 2,337,000 | 2,186,300 | 1,676,400 | 41,900 | 108,700 |
| White | 954,400 | 870,900 | 764,200 | 33,500 | 49,900 | 2,109,700 | 1,973,100 | 1,521,000 | 35,600 | 100,800 |
| Black | 23,900 | 21,400 | 19,400 | 1,300 | 1,400 | 78,900 | 73,700 | 30,600 | 2,800 | 2,400 |
| Asian | 49,700 | 48,500 | 43,100 | 600 | 500 | 100,100 | 94,000 | 72,300 | 2,200 | 3,900 |
| Physical scientists | 203,900 | 186,900 | 154,900 | 5,900 | 9,100 | 312,600 | 288,400 | 264,900 | 4,200 | 20,000 |
| White | 186,100 | 172,400 | 141,200 | 5,300 | 8,300 | 283,800 | 261,800 | 240,400 | 3,700 | 18,300 |
| Black | 3,400 | 3,200 | 2,400 | 200 | (2) | 6,500 | 6,200 | 5,400 | 200 | 100 |
| Asian | 8,200 | 7,600 | 6,400 | 400 | 100 | 16,700 | 15,400 | 14,500 | 200 | 1,200 |
| Mathematical scientists | 55,000 | 48,600 | 43,800 | 2,500 | 3,800 | 140,300 | 131,000 | 103,900 | 1,700 | 7,500 |
| White | 50,400 | 44,200 | 39,400 | 2,500 | 3,600 | 124,700 | 115,500 | 91,300 | 1,500 | 7,200 |
| Black | 2,700 | 2,600 | 2,500 | (2) | 200 | 7,000 | 6,800 | 6,100 | 100 | 100 |
| Asian | 1,700 | 1,600 | 1,700 | (2) | (2) | 6,200 | 5,900 | 4,200 | 100 | 100 |
| Computer specialists | 125,900 | 119,000 | 116,000 | 3,000 | 3,900 | 575,800 | 562,600 | 437,200 | 4,800 | 8,400 |
| White | 116,800 | 110,700 | 108,000 | 2,400 | 3,800 | 508,500 | 497,100 | 388,200 | 4,200 | 7,200 |
| Black | 2,300 | 1,800 | 1,500 | 600 | 100 | 19,300 | 18,900 | 13,200 | 200 | 200 |
| Asian | 4,000 | 4,000 | 3,900 | (2) | 100 | 37,200 | 36,100 | 27,600 | 200 | 900 |
| Environmental scientists | 58,300 | 54,800 | 46,600 | 1,200 | 2,300 | 123,200 | 111,300 | 97,300 | 5,100 | 6,800 |
| White | 51,600 | 48,300 | 40,700 | 900 | 2,300 | 117,400 | 105,800 | 93,600 | 5,000 | 6,600 |
| Black | 2,100 | 2,000 | 1,800 | (2) | (2) | 1,000 | 1,000 | 400 | (2) | (2) |
| Asian | 3,400 | 3,200 | 2,900 | 200 | (2) | 2,300 | 2,100 | 1,900 | 100 | 100 |
| Life scientists | 203,700 | 213,500 | 198,200 | 6,300 | 10,900 | 452,100 | 411,800 | 340,500 | 8,800 | 31,500 |
| White | 217,500 | 200,700 | 186,100 | 6,200 | 10,600 | 415,800 | 377,900 | 313,100 | 8,000 | 29,900 |
| Black | 4,900 | 4,900 | 4,700 | (2) | (2) | 9,300 | 8,800 | 7,100 | 300 | 100 |
| Asian | 5,800 | 5,300 | 5,400 | (2) | 200 | 16,400 | 15,000 | 12,900 | 400 | 1,000 |
| Psychologists | 122,500 | 112,500 | 103,700 | 5,700 | 4,300 | 273,800 | 253,500 | 172,800 | 6,600 | 13,500 |
| White | 114,100 | 105,100 | 97,100 | 4,700 | 4,300 | 252,300 | 234,100 | 161,800 | 5,600 | 12,600 |
| Black | 3,800 | 3,800 | 3,700 | (2) | (2) | 10,000 | 9,100 | 6,000 | 300 | 500 |
| Asian | 1,000 | 1,000 | 700 | (2) | (2) | 5,400 | 5,200 | 1,400 | 200 | 100 |
| Social scientists | 252,200 | 222,300 | 180,500 | 11,900 | 18,100 | 459,400 | 427,800 | 259,800 | 10,600 | 21,000 |
| White | 217,800 | 189,400 | 151,600 | 11,500 | 17,000 | 407,700 | 380,800 | 232,600 | 7,800 | 19,000 |
| Black | 4,700 | 3,300 | 2,900 | 400 | 1,000 | 25,900 | 22,900 | 12,300 | 1,700 | 1,300 |
| Asian | 25,900 | 25,800 | 22,100 | (2) | 100 | 15,800 | 14,200 | 9,700 | 1,000 | 600 |
| Total engineers | 1,481,700 | 1,371,700 | 1,270,[illegible] | 45,600 | 64,400 | 2,634,900 | 2,440,100 | 2,243,500 | 30,800 | 134,000 |
| White | 1,373,700 | 1,271,000 | 1,185,5[illegible] | 39,800 | 63,000 | 2,398,900 | 2,217,300 | 2,035,200 | 25,900 | 155,700 |
| Black | 18,100 | 16,700 | 15,500 | 1,100 | 200 | 44,000 | 41,300 | 37,300 | 1,700 | 1,000 |
| Asian | 80,900 | 58,100 | 55,400 | 1,000 | 1,100 | 139,700 | 132,800 | 126,700 | 2,000 | 4,900 |

[1]Because totals include other and no report, detail may not add to totals.
[2]Too few cases to estimate.

SOURCE: National Science Foundation, SRS

## Table B-43. Hispanic scientists and engineers by employment status and field: 1986[3]

| Field | Total population | Total employed | Employed in S/E | Unemployed, seeking | Outside the labor force |
|---|---|---|---|---|---|
| Total, all fields[2] | 100,100 | 93,400 | 74,900 | 2,000 | 4,800 |
| Total scientists | 50,100 | 46,100 | 31,200 | 1,400 | 2,600 |
| Physical scientists | 5,200 | 4,800 | 4,600 | 200 | 300 |
| Mathematical scientists | 3,200 | 3,100 | 2,600 | (3) | 100 |
| Computer specialists | 9,700 | 9,300 | 6,100 | 100 | 400 |
| Environmental scientists | 2,000 | 1,800 | 1,600 | 100 | 100 |
| Life scientists | 10,800 | 9,900 | 7,100 | 100 | 800 |
| Psychologists | 6,400 | 5,900 | 2,700 | 300 | 200 |
| Social scientists | 12,700 | 11,400 | 6,600 | 700 | 600 |
| Total engineers | 50,000 | 47,200 | 43,700 | 600 | 2,200 |

[1]Includes members of all racial groups
[2]Totals include other and no report.
[3]Too few cases to estimate.

NOTE. Because of rounding, detail may not add to totals
SOURCE. National Science Foundation, SRS

## Table B-44. Selected characteristics of employed doctoral scientists and engineers in the United States: 1975 and 1985

| Characteristics | 1975 | | | 1985 | | |
|---|---|---|---|---|---|---|
| | Number | Percent | Median annual salary | Number | Percent | Median annual salary |
| Total | 255,940 | 100 0 | 23,200 | 400,358 | 100 0 | 44,800 |
| **Field:** | | | | | | |
| Scientists | 213,507 | 83 4 | 22,600 | 334,505 | 83 6 | 42,500 |
| Physical scientists | 54,629 | 21 3 | 23,900 | 67,480 | 16 9 | 47,000 |
| Chemists | 35,825 | 14 0 | 24,000 | 43,735 | 10 9 | 46,000 |
| Physicists/astronomers | 18,804 | 7 3 | 23,700 | 23,745 | 5.9 | 48,400 |
| Mathematical scientists | 13,611 | 5.3 | 21,200 | 16,758 | 4.2 | 42,100 |
| Mathematicians | 11,864 | 4 6 | 20,900 | 13,957 | 3 5 | 41,800 |
| Statisticians | 1,747 | 7 | 23,100 | 2,801 | 7 | 43,700 |
| Computer/information specialists | 3,528 | 1 4 | 23,400 | 14,964 | 3 7 | 46,000 |
| Environmental scientists | 12,103 | 4.7 | 23,500 | 17,288 | 4 3 | 46,800 |
| Earth Scientists | 9,500 | 3 7 | 23,600 | 13,202 | 3 3 | 47,500 |
| Oceanographers | 1,277 | 5 | 22,100 | 1,959 | .5 | 42,300 |
| Atmospheric scientists | 1,326 | 5 | 24,200 | 2,127 | 5 | 47,300 |
| Life scientists | 63,344 | 24 7 | 22,200 | 101,638 | 25.4 | 41,700 |
| Biological scientists | 39,036 | 15 3 | 21,300 | 59,871 | 15.0 | 40,500 |
| Agricultural scientists | 10,993 | 4.3 | 21,800 | 15,513 | 3.9 | 41,200 |
| Medical scientists | 13,315 | 5.2 | 25,700 | 26,454 | 6 6 | 45,900 |
| Psychologists | 30,001 | 11 7 | 22,100 | 52,182 | 13 0 | 39,500 |
| Social scientists | 36,291 | 14.2 | 22,200 | 63,995 | 16 0 | 40,500 |
| Economists | 11,814 | 4 6 | 24,400 | 17,925 | 4.5 | 46,100 |
| Sociologists/anthropologists | 7,910 | 3 1 | 20,600 | 12,692 | 3.2 | 37,200 |
| Other social scientists | 16,567 | 6 5 | 21,100 | 33,378 | 8 3 | 38,300 |
| Engineers | 42,433 | 16 6 | 25,200 | 65,853 | 16.4 | 52,400 |
| Aeronautical/astronautical engineers | 2,019 | 8 | 25,200 | 3,827 | 1.0 | 53,800 |
| Chemical engineers | 5,368 | 2.1 | 26 400 | 7,122 | 1 8 | 55,700 |
| Civil engineers | 3,772 | 1 5 | 22,900 | 6,396 | 1 6 | 48,500 |
| Electrical/electronics engineers | 8,538 | 3 3 | 25,000 | 14,248 | 3 | 55,100 |
| Mechanical engineers | 4,033 | 1 6 | 23,800 | 6,594 | 1 | 51,100 |
| Nuclear engineers | 1,680 | 7 | 25,500 | 2,377 | 6 | 54,200 |
| Other engineers | 17,023 | 6.7 | 25,700 | 25,289 | 6 3 | 52,100 |
| **Sex:** | | | | | | |
| Men | 233,877 | 91 4 | 23,500 | 341,873 | 85 4 | 46,000 |
| Women | 22,063 | 8 6 | 19,100 | 58,485 | 14 6 | 35,500 |
| **Race:** | | | | | | |
| White | 232,777 | 90 9 | 23,300 | 355,125 | 88 7 | 44,800 |
| Black | 2,513 | 1 0 | 22,800 | 5,716 | 1.4 | 40,100 |
| Asian | 13,559 | 5 3 | 21,500 | 34,533 | 8.6 | 45,500 |
| American Indian/Alaskan native | 211 | 1 | 19,100 | 511 | 1 | 42,100 |
| Other | 243 | 1 | 20,600 | 300 | 1 | 40,300 |
| No report | 6,637 | 2 6 | 23,600 | 4,173 | 1.0 | 45,400 |
| **Ethnicity:** | | | | | | |
| Hispanic | 2,033 | 8 | 22,500 | 5,897 | 1 5 | 42,200 |
| Nonhispanic | 110,013 | 43.0 | 23,000 | 365,493 | 91 3 | 44,800 |
| No report | 143,894 | 56 2 | 23,300 | 28,968 | 7 2 | 45,000 |

## Table B-44. Selected characteristics of employed doctoral scientists and engineers in the United States: 1975 and 1985—Con.

| Characteristics | 1975 | | | 1985 | | |
|---|---|---|---|---|---|---|
| | Number | Percent | Median annual salary | Number | Percent | Median annual salary |
| **Age:** | | | | | | |
| Under 30 | 9,540 | 3 7 | 16,900 | 5,935 | 1 5 | 34,800 |
| 30–34 | 55,169 | 21 6 | 18,800 | 48 [illegible] | 12 1 | 35,600 |
| 35–39 | 53,523 | 20 9 | 21,500 | 7[illegible] | 19 5 | 39,200 |
| 40–44 | 40,085 | 15 7 | 24,200 | 86,074 | 21 5 | 45,100 |
| 45–49 | 33,575 | 13 1 | 26,200 | 62,643 | 15 6 | 8,400 |
| 50–54 | 28,709 | 11 2 | 28,100 | 43,507 | 10 9 | 0,200 |
| 55–59 | 18,405 | 7.2 | 28,100 | 34,354 | 8 6 | 51,400 |
| 60–64 | 11,248 | 4 4 | 28,600 | 26,277 | 6 6 | 51,900 |
| 65 and over | 5,492 | 2 1 | 27,600 | 14,560 | 3 6 | 51,700 |
| No report | 194 | 1 | 24,100 | 190 | (1) | (2) |
| **Type of employment:** | | | | | | |
| Science/engineering | 240,223 | 93 9 | 23,100 | 365,361 | 91.3 | 44,500 |
| Other/unknown field | 15,717 | 6 1 | 24,300 | 34,997 | 8 7 | 48,200 |
| **Sector of employment:** | | | | | | |
| Business/industry | 64,621 | 2[illegible] | 26,000 | 125,767 | 31 4 | 52,000 |
| Educational institutions | 149,076 | 58 2 | 21,400 | 211,611 | 52.9 | 40,600 |
| 4-year colleges/universities | 143,615 | 56 1 | 21,500 | 202,019 | 50 5 | 40,800 |
| 2-year colleges | 3,567 | 1.4 | 19,100 | 6,001 | 1.5 | 36,100 |
| Elementary/secondary schools | 1 894 | .7 | 20,400 | 3,591 | 9 | 36,300 |
| Hospitals/clinics | 7,482 | 2 9 | 21,800 | 11,352 | 2.8 | 37,800 |
| Non-profit organizations | 8,334 | 3.3 | 24,400 | 13,617 | 3 4 | 43,900 |
| Federal Government | 18,996 | 7 4 | 26,300 | 26,337 | 6 6 | 48,400 |
| Military/Comm. Corps | 2,130 | 8 | (2) | 1,875 | 5 | (2) |
| State government | 3,015 | 1 2 | 20,900 | 5,87[illegible] | 1 5 | 36,100 |
| Other government | 1,878 | 7 | 22,900 | 2,33[illegible] | 6 | 35,400 |
| Other | 82 | (1) | (2) | 1,213 | 3 | 76,000 |
| No report | 326 | 1 | (2) | 369 | 1 | (2) |
| **Primary work activity:** | | | | | | |
| Research and development | 82,371 | 32.2 | 23,000 | 132,5[illegible] | 33 1 | 45,400 |
| Basic research | 38,137 | 14 9 | 22,200 | 61,451 | 15.3 | 42,400 |
| Applied research | 32,903 | 12.9 | 23,400 | 49,068 | 12.3 | 46,000 |
| Development/design | 11,331 | 4.4 | 23,600 | 21,976 | 5.5 | 48,300 |
| Management/administration | 51,737 | 20 2 | 29,600 | 69,632 | 17 4 | 55,700 |
| Of R&D | 28,657 | 11.2 | 30,100 | 34,938 | 8 7 | 60,300 |
| Of other | 23,080 | 9 0 | 28,600 | 34,694 | 8 7 | 50,900 |
| Teaching | 9 | 35 6 | 20,600 | 111,717 | 27 9 | 39,200 |
| Consulting | 5,[illegible] | 2.2 | 25,500 | 14,164 | 3 5 | 50,600 |
| Sales/professional services | 11,660 | 4 6 | 21,900 | 36,496 | 9 1 | 42,500 |
| Other | 7,482 | 2.9 | 22,100 | 24,761 | 6 2 | 45,200 |
| No report | 6,073 | 2 4 | 23,700 | 11,073 | 2 8 | 44,500 |

[1]Less than .05 percent.

[2]No median computed for groups with fewer than 20 individuals reporting salary

NOTE. Because of rounding, percents may not add to 100 Median salaries computed for full-time employed civilians only

SOURCE: National Science Foundation, SRS

## Table B-45. Selected characteristics of employed women doctoral scientists and engineers in the United States: 1975 and 1985

| Characteristics | 1975 | | | | 1985 | | | |
|---|---|---|---|---|---|---|---|---|
| | Number | Percent | Percent of total employed | Median annual salary | Number | Percent | Percent of total employed | Median annual salary |
| Total | 22,063 | 100 0 | 6 6 | 19,100 | 58,485 | 100 0 | 14.6 | 35,500 |
| **Field:** | | | | | | | | |
| Scientists | 21,830 | 96 9 | 10.2 | 19,000 | 56,997 | 97 5 | 17 0 | 35 300 |
| Physical scientists | 2,539 | 11 5 | 4 6 | 19,100 | 4,671 | 8 0 | 6 9 | 38,600 |
| Chemists | 2,065 | 9 4 | 5.8 | 19,100 | 3,805 | 6 5 | 8.7 | 38,200 |
| Physicists/astronomers | 474 | 2 1 | 2 5 | 19,400 | 866 | 1 5 | 3.6 | 41,200 |
| Mathematical scientists | 906 | 4 1 | 6 7 | 16,400 | 1,559 | 2.7 | 9.3 | 35,400 |
| Mathematicians | 821 | 3 7 | 6 9 | 18,200 | 1,233 | 2 1 | 8.8 | 34,700 |
| Statisticians | 85 | 4 | 4 9 | 21,700 | 326 | 6 | 11.6 | 38,800 |
| Computer/information specialists | 148 | 7 | 4 2 | 18,000 | 1,619 | 2.8 | 10 8 | 38,600 |
| Environmental scientists | 325 | 1 5 | 2.7 | 19,100 | 1,089 | 1 9 | 6.3 | 38,700 |
| Earth Scientists | 242 | 1.1 | 2.5 | 16,200 | 760 | 1.3 | 5.8 | 39,200 |
| Oceanographers | 51 | 2 | 4.0 | (2) | 247 | 4 | 12 6 | 36,900 |
| Atmospheric scientists | 32 | .1 | 2.4 | (2) | 82 | 1 | 3.9 | 39,100 |
| Life scientists | 7,533 | 34 1 | 11.9 | 19,000 | 19,892 | 33 7 | 19 3 | 35,100 |
| Biological scientists | 5,780 | 26.2 | 14.8 | 16,500 | 12,637 | 21 6 | 21 1 | 34,500 |
| Agricultural scientists | 148 | 7 | 1.3 | 20,200 | 82[illegible] | 1.4 | 5.3 | 31,900 |
| Medical scientists | 1,605 | 7 3 | 12.1 | 20,600 | 6,226 | 10.6 | 23.5 | 38,200 |
| Psychologists | 6,305 | 28.6 | 21 0 | 19,600 | 16,609 | 28.4 | 31.8 | 34,800 |
| Social scientists | 4,074 | 18 5 | 11.2 | 18,700 | 11,758 | 20.1 | 18 4 | 34,600 |
| Economists | 635 | 2 9 | 5 4 | 21,000 | 1,709 | 2 9 | 9.5 | 38,300 |
| Sociologists/anthropologists | 1,656 | 7 5 | 20 9 | 18,400 | 3,625 | 6.2 | 28.6 | 34,200 |
| Other social scientists | 1,783 | 8 1 | 10.8 | 18,200 | 6,424 | 11.0 | 19.2 | 33,700 |
| Engineers | 233 | 1 1 | 5 | 21,200 | 1,488 | 2.5 | 2.3 | 43,900 |
| Aeronautical/astronautical engineers | 18 | 1 | .8 | (2) | 95 | .2 | 2.5 | 44,500 |
| Chemical engineers | 23 | 1 | 4 | (2) | 101 | .2 | 1 4 | 43,500 |
| Civil engineers | 5 | (1) | 1 | (2) | 91 | 2 | 1 4 | 37,000 |
| Electrical/electronics engineers | 45 | 2 | 5 | (2) | 347 | 6 | 2.4 | 45,600 |
| Mechanical engineers | 9 | (1) | 2 | (2) | 58 | 1 | .9 | 42,000 |
| Nuclear engineers | 10 | (1) | 6 | (2) | 32 | 1 | 1.3 | (2) |
| Other engineers | 125 | 6 | 7 | 22,200 | 764 | 1 3 | 3.0 | 44,000 |
| **Race:** | | | | | | | | |
| White | 20,129 | 91 2 | 6 6 | 19,000 | 52,035 | 89 0 | 14 7 | 35,500 |
| Black | 422 | 1 9 | 16 8 | 20,400 | 1,707 | 2 9 | 29.9 | 34,500 |
| Asian | 1,134 | 5 1 | 8 4 | 18,900 | 4,129 | 7 1 | 12 0 | 36,800 |
| American Indian/Alaskan native | 11 | (1) | 5.2 | (2) | 63 | 1 | 12.3 | (2) |
| Other | 37 | 2 | 15 2 | (2) | 76 | 1 | 25.3 | (2) |
| No report | 330 | 1 5 | 5 0 | 20,300 | 475 | 8 | 11.4 | 35,000 |
| **Ethnicity:** | | | | | | | | |
| Hispanic | 215 | 1 0 | 10 6 | 19,700 | 951 | 1 6 | 16 1 | 34,900 |
| Nonhispanic | 15,574 | 70 6 | 14 2 | 19,100 | 53,937 | 92 2 | 14 8 | 35,500 |
| No report | 6,274 | 28 4 | 4 4 | 18,900 | 3,597 | 6 2 | 12 4 | 38,300 |

## Table B-45. Selected characteristics of employed women doctoral scientists and engineers in the United States: 1975 and 1985—Con.

| Characteristics | 1975 | | | | 1985 | | | |
|---|---|---|---|---|---|---|---|---|
| | Number | Percent | Percent of total employed | Median annual salary | Number | Percent | Percent of total employed | Median annual salary |
| **Age:** | | | | | | | | |
| Under 30 | 1,535 | 7.0 | 16.1 | 15,900 | 1,427 | 2.4 | 23.8 | 30,900 |
| 30–34 | 4,973 | 22.5 | 9.0 | 16,800 | 11,345 | 19.4 | 23.4 | 30,900 |
| 35–39 | 4,081 | 18.5 | 7.6 | 18,300 | 14,525 | 24.8 | 18.6 | 34,200 |
| 40–44 | 2,910 | 12.7 | 7.0 | 20,000 | 11,813 | 20.2 | 13.7 | 36,200 |
| 45–49 | 2,887 | 13.1 | 8.6 | 21,500 | 7,143 | 12.2 | 11.4 | 38,300 |
| 50–54 | 2,416 | 11.0 | 8.4 | 22,400 | 4,475 | 7.7 | 10.3 | 39,000 |
| 55–59 | 1,460 | 6.6 | 7.9 | 21,700 | 3,522 | 6.0 | 10.3 | 40,700 |
| 60–64 | 1,160 | 5.3 | 10.3 | 22,600 | 2,529 | 4.3 | 9.6 | 42,400 |
| 65 and over | 714 | 3.2 | 13.0 | 22,300 | 1,647 | 2.8 | 11.3 | 42,300 |
| No report | 27 | .1 | 13.9 | (2) | 58 | 1 | 30.5 | (2) |
| **Type of employment:** | | | | | | | | |
| Science/engineering | 20,503 | 92.9 | 8.5 | 19,000 | 52,494 | 89.8 | 14.4 | 35,500 |
| Other/unknown field | 1,560 | 7.1 | 9.9 | 19,600 | 5,991 | 10.2 | .1 | 35,700 |
| **Sector of employment:** | | | | | | | | |
| Business/industry | 2,139 | 9.7 | 3.3 | 22,200 | 12,945 | 22.1 | 10.3 | 42,400 |
| Educational institutions | 15,486 | 70.2 | 10.4 | 18,500 | 34,338 | 58.7 | 16.2 | 33,900 |
| 4-year colleges/universities | 14,196 | 64.4 | 9.9 | 18,400 | 31,681 | 54.2 | 15.7 | 33,800 |
| 2-year colleges | 701 | 3.2 | 19.7 | 18,700 | 1,305 | 2.2 | 21.7 | 36,700 |
| Elementary/secondary schools | 589 | 2.7 | 31.1 | 20,700 | 1,352 | 2.3 | 37.6 | 35,900 |
| Hospitals/clinics | 1,750 | 7.9 | 23.4 | 19,500 | 3,393 | 5.8 | 29.9 | 39,400 |
| Non-profit organizations | 914 | 4.1 | 11.0 | 19,600 | 3,184 | 5.4 | 23.4 | 38,600 |
| Federal Government | 1,033 | 4.7 | 5.4 | 24,700 | 2,684 | 4.6 | 10.2 | 40,900 |
| Military/Comm. Corps | 39 | .2 | 1.8 | (2) | 93 | .2 | 5.0 | (2) |
| State government | 393 | 1.8 | 13.0 | 19,800 | 1,111 | 1.9 | 18.9 | 33,300 |
| Other government | 233 | 1.1 | 12.4 | 20,000 | 513 | .9 | 21.9 | 31,700 |
| Other | 15 | .1 | 18.3 | (2) | 147 | .3 | 12.1 | 42,400 |
| No report | 59 | .3 | 18.1 | (2) | 67 | .1 | 18.2 | (2) |
| **Primary work activity:** | | | | | | | | |
| Research and development | 5,998 | 27.2 | 7.3 | 19,100 | 16,463 | 28.1 | 12.4 | 36,200 |
| Basic research | 4,450 | 20.2 | 11.7 | 18,400 | 10,110 | 17.3 | 16.5 | 35,000 |
| Applied research | 1,323 | 6.0 | 4.0 | 20,400 | 4,934 | 8.4 | 10.1 | 38,000 |
| Development/design | 225 | 1.0 | 2.0 | 23,300 | 1,419 | 2.4 | 6.5 | 39,800 |
| Management/administration | 2,432 | 11.0 | 4.7 | 23,100 | 7,083 | 12.1 | 10.2 | 42,300 |
| Of R&D | 893 | 4.0 | 3.1 | 24,700 | 2,108 | 3.6 | 8.0 | 47,500 |
| Of other | 1,539 | 7.0 | 6.7 | 22,400 | 4,975 | 8.5 | 14.3 | 40,500 |
| Teaching | 9,441 | 42.8 | 10.4 | 18,200 | 17,620 | 30.1 | 15.8 | 33,200 |
| Consulting | 398 | 1.8 | 7.2 | 20,700 | 1,434 | 2.5 | 10.1 | 36,900 |
| Sales/professional services | 2,353 | 10.7 | 20.2 | 20,000 | 9,791 | 16.7 | 26.8 | 35,500 |
| Other | 822 | 3.7 | 11.0 | 18,400 | 4,054 | 6.9 | 16.4 | 35,400 |
| No report | 619 | 2.8 | 10.2 | 20,600 | 2,040 | 3.5 | 18.4 | 37,100 |

[1]Less than .05 percent.
[2]No median computed for groups with fewer than 20 individuals reporting salary.
NOTE: Because of rounding, percents may not add to 100. Median salaries computed for full-time employed civilians only
SOURCE: National Science Foundation, SRS

## Table B-46. Total and foreign full-time graduate enrollment in science/engineering doctoral-granting institutions: 1976 and 1986

| Selected field | 1976 | | | 1986 | | |
|---|---|---|---|---|---|---|
| | Total | Foreign | Percent | Total | Foreign | Percent |
| Total science/engineering | 214,089 | 34,400 | 16.1% | 259,980 | 72,809 | 28 0% |
| Total, science | 173,575 | 21,174 | 12.2 | 200,055 | 46,482 | 23.1 |
| Biological | 35,624 | 3,532 | 9.9 | 36,916 | 7,003 | 19 0 |
| Computer | 4,283 | 1,005 | 23.5 | 13,504 | 5,439 | 40.3 |
| Earth, environmental, marine | 9,668 | 977 | 10.1 | 10,909 | 1,798 | 16.5 |
| Mathematical | 10,281 | 2,179 | 21.2 | 11,767 | 4,962 | 42 2 |
| Physical | 21,590 | 4,428 | 20 5 | 27,074 | 9,152 | 33 8 |
| Social | 48,651 | 6,302 | 13.0 | 47,589 | 11,666 | 2' 5 |
| Other | 43,478 | 2,751 | 6.3 | 52,296 | 6,162 | 11 8 |
| Total, engineering | 36,231 | 12,221 | 33.7 | 59,925 | 26,627 | 44.4 |
| Chemical | 3,657 | 1,537 | 42.0 | 5,542 | 2,155 | 38.9 |
| Civil | 6,892 | 1, | 28.8 | 10,128 | 4,694 | 46.3 |
| Electrical | 8,063 | 2,719 | 33.7 | 15,851 | 7,455 | 47 0 |
| Industrial | 3,475 | 1,037 | 29.8 | 4,527 | 1 952 | 43 1 |
| Mechanical | 4,861 | 1,791 | 36.8 | 9,485 | 4,459 | 47.0 |
| Other | 9,283 | 3,151 | 33.9 | 14,392 | 5.912 | 41.1 |

SOURCE: National Science Foundation, SRS

## Table B-47. Bachelor's and first-professional degrees awarded by field: 1960–86

| Year | All fields | Science/engineering fields | | | | | | All other fields[4] |
|---|---|---|---|---|---|---|---|---|
| | | Total | Physical sciences[1] | Engineering | Mathematical sciences[2] | Life sciences | Social sciences[3] | |
| | Number | | | | | | | |
| 1960 | 394,889 | 120,937 | 16,057 | 37,808 | 11,437 | 24,141 | 31,494 | 273,952 |
| 1961 | 401,784 | 121,660 | 15,500 | 35,866 | 13,127 | 23,900 | 83,267 | 280,124 |
| 1962 | 420,485 | 127,469 | 15,894 | 34,735 | 14,610 | 25,200 | 37,030 | 293,016 |
| 1963 | 450,592 | 135,964 | 16,276 | 33,458 | 16,128 | 27,801 | 42,306 | 314,628 |
| 1964 | 502,104 | 153,361 | 17,527 | 35,226 | 18,677 | 31,611 | 50,320 | 348,743 |
| 1965 | 538,930 | 164,936 | 17,9 6 | 36,795 | 19,668 | 34,842 | 55. 5 | 373,994 |
| 1966 | 555,613 | 173,471 | 17,186 | 35,815 | 20,182 | 36,964 | 63,-24 | 382,142 |
| 1967 | 594,862 | 187,849 | 17,794 | 36,188 | 21,530 | 39,406 | 72,929 | 407,013 |
| 1968 | 671,591 | 212,174 | 19,442 | 37,614 | 24,084 | 43,260 | 87,774 | 459,417 |
| 1969 | 769,683 | 244,51' | 21,591 | 41,553 | 28,283 | 48,713 | 104,399 | 525,164 |
| 1970 | 833,322 | 264,122 | 21,551 | 44,772 | 29,109 | 52,129 | 116,561 | 569,200 |
| 1971 | 884,386 | 271,176 | 21,549 | 45,387 | 27,306 | 51,461 | 125,473 | 613,210 |
| 1972 | 937,884 | 281,228 | 20,887 | 46,003 | 27,250 | 51,484 | 133,604 | 656,656 |
| 1973 | 980,707 | 295,391 | 20,809 | 46,989 | 27,528 | 59,486 | 140,579 | 685,316 |
| 1974 | 1,008,654 | 305,002 | 21,287 | 43,530 | 26,570 | 68,226 | 145,449 | 703,592 |
| 1975 | 987,922 | 294,920 | 20,896 | 40,065 | 23,385 | 72,710 | 137,864 | 693,002 |
| 1976 | 997,504 | 292,174 | 21,559 | 33,114 | 21,749 | 77,301 | 132,451 | 705,330 |
| 1977 | 993,008 | 288,543 | 22,618 | 41,581 | 20,729 | 78,472 | 125,143 | 704,465 |
| 1978 | 997,165 | 288,167 | 23,175 | 47,411 | 19,925 | 77,138 | 120,518 | 708,998 |
| 1979 | 1,000,562 | 288,625 | 23,363 | 53,720 | 20,670 | 75,085 | 115,787 | 711,937 |
| 1980 | 1,010,777 | 291,983 | 23,661 | 59,240 | 22,686 | 71,617 | 114,779 | 718,794 |
| 1981 | 1,019,646 | 294,867 | 24,175 | 64,068 | 26,406 | 68,086 | 112,132 | 724,379 |
| 1982 | 1,036,597 | 302,118 | 24,372 | 67,791 | 32,139 | 65,041 | 112,775 | 734,479 |
| 1983 | 1,054,242 | 307,225 | 23,497 | 72,954 | 37,235 | 63,237 | 110,302 | 747,017 |
| 1984 | 1,061,245 | 314,666 | 23,759 | 76,531 | 45,777 | 59,613 | 108,986 | 746,750 |
| 1985 | 1,066,439 | 321,739 | 23,847 | 77,871 | 54,388 | 57,812 | 107,821 | 744,700 |
| 1986 | 1,074,785 | 323,950 | 21,862 | 77,061 | 58,583 | 56,465 | 109,979 | 750,835 |

[1]Includes environmental sciences.
[2]Includes statistics and computer science.
[3]Excludes history and includes psychology.
[4]Includes first-professional degrees such as M.D., D.D.S., D.V.M., and J.D. degrees.
SOURCE: National Science Foundation, SRS

## Table B-48. Master's degrees awarded by field: 1960–96

| Year | All fields | Science/engineering fields | | | | | | All other fields |
|---|---|---|---|---|---|---|---|---|
| | | Total | Physical sciences[1] | Engineering | Mathematics/ computer sciences[2] | Life sciences | Social sciences[3] | |
| | Number | | | | | | | |
| 1960 | 74,497 | 20,012 | 3,387 | 7,159 | 1,765 | 3,751 | 3,950 | 54,485 |
| 1961 | 78,269 | 22,786 | 3 799 | 8,178 | 2,238 | 4,085 | 4,486 | 55,483 |
| 1962 | 84,889 | 25,146 | 3,929 | 8,909 | 2,680 | 4,672 | 4,956 | 59,743 |
| 1963 | 91,418 | 27,367 | 4,132 | 9,635 | 3,323 | 4,718 | 5,559 | 64,051 |
| 1964 | 101,122 | 30,271 | 4,567 | 10,827 | 3,603 | 5,357 | 5,917 | 70,851 |
| 1965 | 112,195 | 33,835 | 4,918 | 12,056 | 4,294 | 5,978 | 6,589 | 78,360 |
| 1966 | 140,772 | 38,083 | 4,992 | 13,678 | 5,010 | 6,666 | 7,737 | 102,689 |
| 1967 | 157,892 | 41,800 | 5,412 | 13,885 | 5,733 | 7,465 | 9,305 | 116,092 |
| 1968 | 177,150 | 45,425 | 5,508 | 15,188 | 6,081 | 8,315 | 10,333 | 131,725 |
| 1969 | 194,414 | 48,425 | 5,911 | 15,243 | 6,735 | 8,809 | 11,727 | 145,989 |
| 1970 | 209,387 | 49,318 | 5,948 | 15,597 | 7,107 | 8,590 | 12,076 | 160,069 |
| 1971 | 231,486 | 50,624 | 6,386 | 16,347 | 6,789 | 8,320 | 12,782 | 180,862 |
| 1972 | 252,774 | 53,567 | 6,307 | 16,802 | 7,186 | 8,914 | 14,358 | 199,207 |
| 1973 | 264,525 | 54,234 | 6,274 | 16,758 | 7,146 | 9,080 | 14,976 | 210,291 |
| 1974 | 278,259 | 54,175 | 6,087 | 15,393 | 7,116 | 9,605 | 15,974 | 224,084 |
| 1975 | 293,651 | 53,852 | 5,830 | 15,434 | 6,637 | 9,618 | 16,333 | 239,799 |
| 1976 | 313,001 | 54,747 | 5,485 | 16,170 | 6,466 | 9,823 | 16,802 | 258,254 |
| 1977 | 318,241 | 56,731 | 5,345 | 16,889 | 6,496 | 10,707 | 17,294 | 261,510 |
| 1978 | 312,816 | 56,237 | 5,576 | 17,105 | 6,421 | 10,711 | 16,514 | 256,579 |
| 1979 | 302,075 | 54,456 | 5,464 | 16,193 | 6,101 | 10,719 | 15,979 | 247,619 |
| 1980 | 299,095 | 54,391 | 5,233 | 16,846 | 6,515 | 10,278 | 15,519 | 244,704 |
| 1981 | 296,798 | 54,811 | 5,300 | 17,373 | 6,787 | 9,731 | 15,620 | 241,987 |
| 1982 | 296,580 | 57,025 | 5,526 | 18,594 | 7,666 | 9,824 | 15,415 | 239,555 |
| 1983 | 290,931 | 58,868 | 5,288 | 19,721 | 8,160 | 9,720 | 15,979 | 232,063 |
| 1984 | 285,462 | 59,569 | 5,568 | 20,352 | 8,939 | 9,330 | 15,290 | 225,893 |
| 1985 | 287,213 | 61,278 | 5,80[illegible] | 21,206 | 9,999 | 9 757 | 15,524 | 225,935 |
| 1986 | 289,829 | 62,526 | 5,910 | 21,314 | 11,241 | 8,572 | 15,489 | 227,303 |

[1]Includes environmental sciences.
[2]Includes statistics.
[3]Excludes history and includes psychology.
SOURCE: National Science Foundation, SRS

## Table B-49. Doctorate degrees awarded by field: 1960–86

| Year | All fields | Science/engineering fields | | | | | | All other fields |
|---|---|---|---|---|---|---|---|---|
| | | Total | Physical sciences[1] | Engineering | Mathematics/ computer sciences[2] | Life sciences | Social sciences[3] | |
| | Number | | | | | | | |
| 1960 | 9,733 | 6,263 | 1,861 | 794 | 291 | 1,660 | 1,657 | 3,470 |
| 1961 | 10,413 | 6,721 | 1,993 | 940 | 332 | 1,682 | 1,774 | 3,692 |
| 1962 | 11,500 | 7,438 | 2,097 | 1,216 | 388 | 1,867 | 1,870 | 4,062 |
| 1963 | 12,728 | 8,219 | 2,427 | 1,357 | 483 | 1,976 | 1,976 | 4,509 |
| 1964 | 14,325 | 9,224 | 2,527 | 1,664 | 588 | 2,219 | 2,226 | 5,101 |
| 1965 | 16,340 | 10,476 | 2,865 | 2,074 | 685 | 2,539 | 2,313 | 5,864 |
| 1966 | 17,949 | 11,458 | 3,059 | 2,301 | 769 | 2,711 | 2,618 | 6,491 |
| 1967 | 20,403 | 12,992 | 3,503 | 2,604 | 830 | 2,966 | 3,079 | 7,421 |
| 1968 | 22,936 | 14,448 | 3,681 | 2,855 | 971 | 3,511 | 3,430 | 8,486 |
| 1969 | 25,743 | 16,039 | 3,935 | 3,265 | 1,070 | 3,815 | 3,954 | 9,704 |
| 1970 | 29,498 | 17,743 | 4,407 | 3,434 | 1,225 | 4,165 | 4,516 | 11,755 |
| 1971 | 31,867 | 18,949 | 4,501 | 3,498 | 1,238 | 4,557 | 5,155 | 12,918 |
| 1972 | 33,041 | 19,007 | 4,257 | 3,503 | 1,281 | 4,454 | 5,512 | 14,034 |
| 1973 | 33,755 | 19,001 | 4,078 | 3,364 | 1,233 | 4,503 | 5,823 | 14,754 |
| 1974 | 33,047 | 18,313 | 3,765 | 3,147 | 1,211 | 4,304 | 5,886 | 14,734 |
| 1975 | 32,951 | 18,356 | 3,710 | 3,002 | 1,147 | 4,402 | 6,097 | 14,593 |
| 1976 | 32,946 | 17,864 | 3,506 | 2,834 | 1,003 | 4,361 | 6,160 | 15,082 |
| 1977 | 31,716 | 17,417 | 3,415 | 2,643 | 964 | 4,266 | 6,129 | 14,299 |
| 1978 | 30,875 | 17,048 | 3,234 | 2,423 | 959 | 4,369 | 6,063 | 13,827 |
| 1979 | 31,237 | 17,245 | 3,320 | 2,490 | 979 | 4,501 | 5,955 | 13,992 |
| 1980 | 31,017 | 17,199 | 3,149 | 2,479 | 962 | 4,715 | 5,894 | 13,818 |
| 1981 | 31,353 | 17,633 | 3,210 | 2,528 | 960 | 4,786 | 6,149 | 13,720 |
| 1982 | 31,096 | 17,625 | 3,351 | 2,646 | 940 | 4,840 | 5,848 | 13,471 |
| 1983 | 31,216 | 17,931 | 3,439 | 2,781 | 987 | 4,749 | 5,975 | 13,285 |
| 1984 | 31,277 | 18,075 | 3,459 | 2,913 | 993 | 4,872 | 5,838 | 13,202 |
| 1985 | 31,211 | 18,261 | 3,534 | 3,167 | 998 | 4,832 | 5,680 | 12,950 |
| 1986 | 31,770 | 18,792 | 3,679 | 3,376 | 1,129 | 4,790 | 5,818 | 12,978 |

[1]Includes environmental sciences.
[2]Includes statistics.
[3]Excludes history and including psychology.
SOURCE: National Science Foundation, SRS